Scientific American.

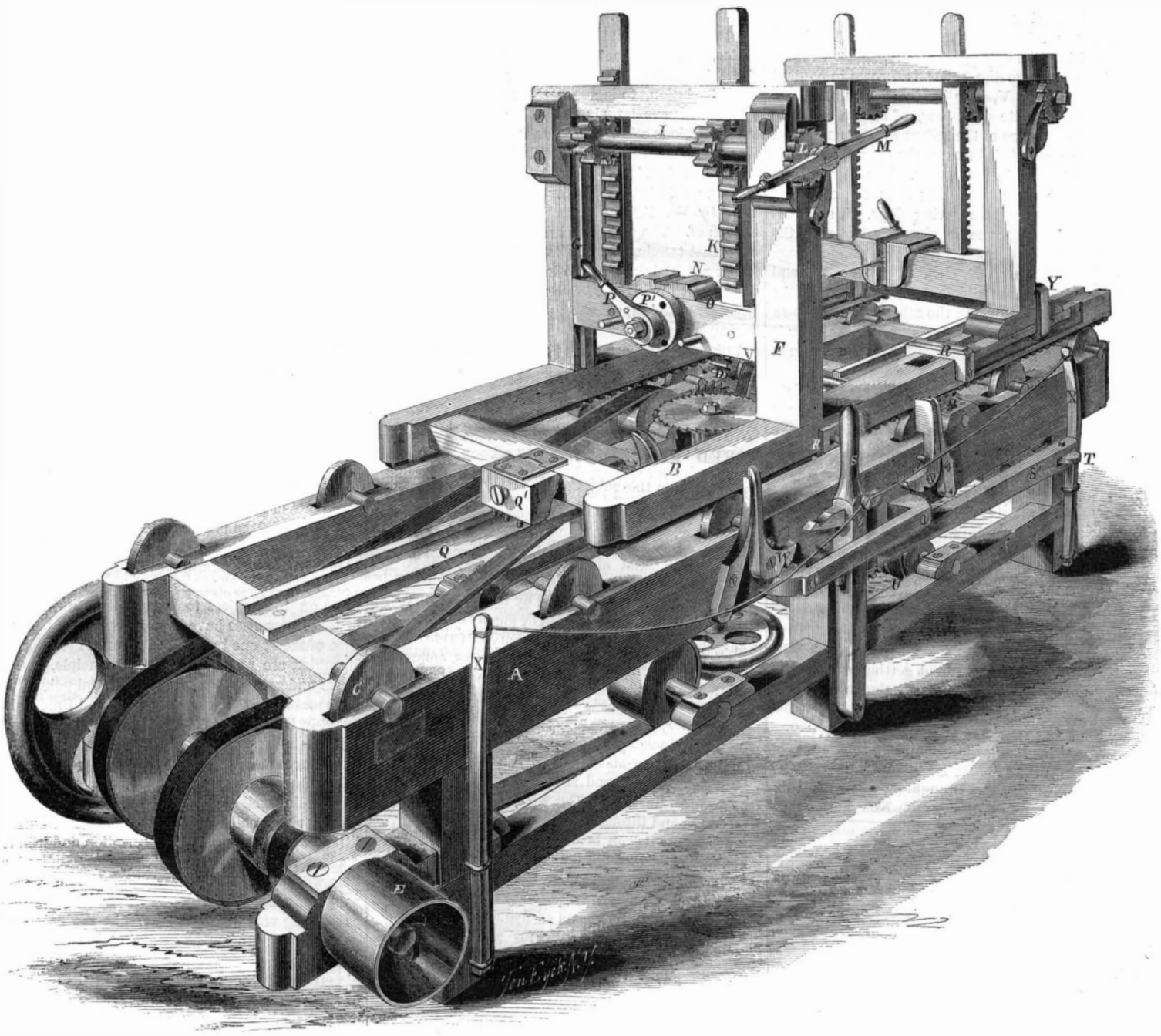
A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. X.—No. 5. (NEW SERIES.) NEW YORK, JANUARY 30, 1864. SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.

Improved Sawing Machine.

It has often occurred to us that if the idea were feasible, it would be an excellent plan to reproduce, with the thousand-and-one inventions that are constantly passing through our hands, the rude and clumsy machines that were employed years ago in their stead. In so doing, the merits of the new machines would be strongly contrasted with the inefficiency of the old-time processes, and the most casual observer or sceptical individual could not fail to be impressed with the value of "the latest improvement." As such a course is obviously impossible, it only remains for us to faithfully delineate and describe the inspirations of modern inventors, and leave the useless tools to molder in the dust and gloom in which their demerits are properly concealed.

Our artists have here given a very accurate and beautiful engraving of Bowers's improved Sawing Machine, by the aid of which strips of wood for hay, fork, broom, and hoe handles, for curtain rollers, or indeed any purpose where straight and true wooden batons are required, are produced direct from the log, without the round-about and unnecessary process of sawing the timber into planks at first.



BOWERS'S SAWING MACHINE.

The plan of the machine is as follows :—

The strong wooden frame, A, carries another frame, B, which is mounted on rollers C, and has a rack for a portion of its length on the under side, into which a pinion, D, gears. This rack and pinion, as well as all the other machinery, is driven by a belt running on the main pulley, E; from the shaft to which it is keyed, various belts run to counter shafts in the body of the machine, thus driving the several parts. The cutters consist of two circular saws, one running vertically and the other horizontally; they may be seen near the center between the frames. Upon the frame, B, there are two upright timbers, F, which are strongly fastened thereto, and these timbers have slides, G, on the inside, on which the cross beams work. There is also a transverse shaft, I, on these timbers, which carries a pinion, J, on each end, said pinions gearing into racks, K, secured to the cross beam; there is a ratchet wheel and pawl, L, on the end of this shaft, which, in connection with the two-handed lever, M, retains the rack and beam at any desired hight. On the cross beams there are sliding carriages, N, which have racks on the under side, at, O, which mesh into pinions set in a mortise in each beam.

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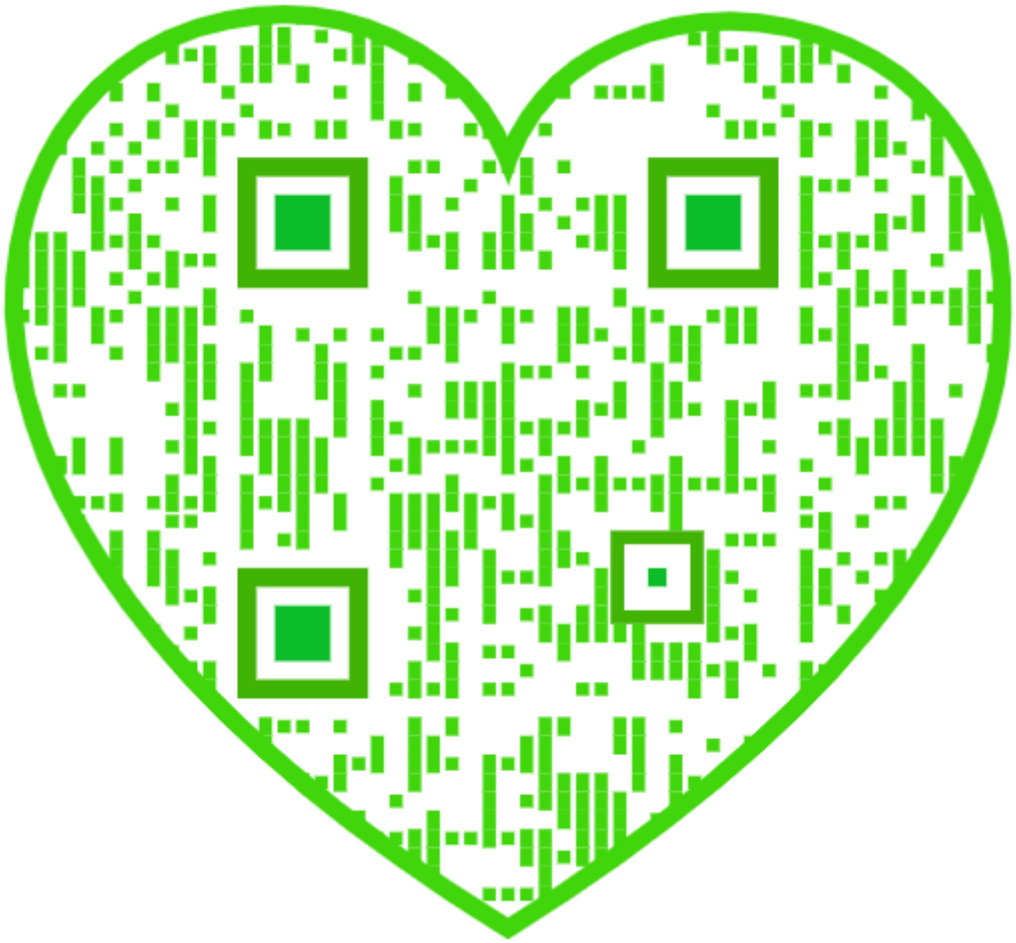

These pinions are worked by the lever, P; there is a pin in each lever, and also a perforated plate, P′, in which the pin fits. These are the principal details; the operation is as follows:—

The log to be worked up into stripes is previously cut of the right length and suspended between the two frames, as shown by the arrow; it is removed in the engraving, as it would hide important parts of the machine. The entire frame, B, and all its fixtures runs on the friction rollers, C, said motion being given by the rack and pinion, D; of course this carries the log up to the saws, which are supposed to be rapidly revolving; they each take a cut, one horizontally and the other vertically, which, in meeting, separate a strip from the log. This strip falls on to the ways, Q, where the hinged pawl, Q′, seizes it, and, as the carriage continues to advance, pushes it off clear of the gearing below; for this pawl is so arranged that it lifts up when the carriage runs back, but engages with a strip through the agency of the teeth on its under side when the carriage advances.

The back-and-forth motion of the carriage, B, is obtained by the dog, R, and lever, S. The lever connects with a horizontal bar, S′, which in turn works an arm, T, carrying slides and rollers inside of the frame. These rollers press against the belts, U and V, which drives the carriage one way, and on the return of the carriage the roller is thrown in contact with another belt, V, also inside the frame; these belts run in opposite directions, of course, and by the alternate pressure of the rollers which work "fast and loose" on each belt in turn, the carriage and log is moved up to and from the saw. The lever, S, has two catches on a bar projecting from the side, and these catches engage with spring dogs, W, and hold the roller inside the frame in close contact with the belt, making it hug the pulley tightly; as the carriage is run along, the stop, R, strikes the dog, W, and throws the roller clear of the belt, thus leaving the carriage free to return when the other roller is thrown against the other belt. By the stop, W, the lever is always returned to a vertical position by the action of the springs and cords, X.

The carriage can be set at any point to accommodate logs of any length, by unscrewing a bolt in the heads of the clamps, Y, and sliding the uprights along to the desired point, and the log is adjusted after strips have been cut from it all around, by lowering the centers, N, with the rack and lever. The operation thus goes on until the work is completed.

The various parts of this machine are arranged most ingeniously to attain the desired end. It does not appear to be a combination of half a dozen different inventions, but the inventor seems to have started with a purely original idea, and has carried out the same in a practical manner.

This machine was patented by Isaac W. Bowers, Ovid Center, Mich., August 25, 1863, through the Scientific American Patent Agency. For further information address the inventor at that place.

PHOTOGRAPHY IN THE PAST YEAR.

[From the London *Photographic News.*]

The past year has been in many respects a successful one for photography. Commercially its applications have been extending, and its professors have been generally prosperous. The art itself has been progressing and expanding. Well understood processes have been acquiring greater stability and excellence. Some new principles in the other processes have received recognition, and specific improvement has been made. General activity, increased scope and usefulness, and steady improvement, are amongst the facts to be recorded in this year's chronicle of the art.

Perhaps dry-plate photography presents some of the most noteworthy modifications. The value of certain alkaline conditions, which, at the commencement of the year was beginning to obtain hesitating recognition, is now an accepted fact of great importance. The idea seems to have been of such uncertain and gradual growth, that it is difficult to trace it to its origin. Although Mr. Bartholomew's alkaline gelatine process appears to contain one of the earliest distinct indications of the value of alkaline conditions, nothing further of a very definite kind seemed to proceed from it. The starting point of fresh experiment appears to have been the American practice of fuming the tannin plates before exposure. From this, Mr. Leahy and Major Russell, each independently, arrived at alkaline development. The latter gentleman had added to the claims he has upon photographers, by the assiduity with which he has worked during the year, to secure certainty in the application of this and other principles to dry-plate photography. The use of a simply bromized collodion, proposed ten years ago for the wet process, and but little used, is now likely to come largely into use in the wet process. In the year 1853, we find J. F. W. Herschell remarking, when speaking of the hard black and white effects of iodized collodion, that "iodine must be thrown over board or limited in its use *coute qui coute*, if photography shall ever satisfy the desires of the artists," and he then adds: "A new photography has to be created, of which bromine is the basis." It is possible, in dry photography at least, that this remark may still become true. It is a somewhat singular fact as bromine played such an important part in the first, most successful and beautiful dry process—that on silver plates—that its value in other dry plates should have been so tardily discovered or acknowledged. We have not heard much of hot development for tannin recently; but some of the charming instantaneous pictures sent by Col. Stuart Wortley, at the last year's Photographic Exhibition, were produced on tannin plates, and with the aid, we understand, of hot development. The addition of various substances to the tannin solution, to increase the sensitiveness of the plate, has been largely discussed; but the utility of such additions still remains an open question. The idea enunciated by Mr. Bartholomew, and further worked out by Mr. Hannaford, of adding silver to the albumen solution in Fothergill plates, has been revived by Mr. Fothergill, and the results are highly spoken of. The new principle discovered by M. Poitevin, that tannin, and similar oxidizable substances, act as sensitizing agents to insensitive iodide of silver, and supply the place of free nitrate of silver, is most important, and may probably be of great value in reducing to definite form the many vague ideas at present prevailing on dry-plate photography.

Printing processes have occupied considerable attention during the year. The introduction of enameled papers for securing a surface registering perfectly all the detail in the finest negative, was at first hailed by many photographers as a boon. When the sample of paper was good, the prints were certainly very delicate, and in many respects beautiful; but the uncertainty of the results, arising chiefly out of the imperfect preparation of much of the paper and some other causes, have tended to give the enameled papers a short-lived popularity, and they are now, we believe, rarely used. From the same cause, imperfect preparation, a paper which promised many advantages, for large pictures, in its freedom from gloss, and yielding fine vigorous prints, introduced under the name of amorphous albumenized paper, has been condemned as unsatisfactory. Gold toning processes have again been under examination, and amongst many photographers a decision in favor of the bath containing chloride of lime has been given, on the ground that it is simple, economical and satisfactory in use. Fixing processes have been reconsidered, and M. Meynier's proposal to supersede the troublesome and readily decomposed salt now used, hyposulphite of soda, by the more stable sulphocyanide of ammonium, has excited much attention, but the latter salt has not yet come into any extended use. One of the earliest objections made, the high price of the salt, has disappeared, as M. Meynier is now enabled to manufacture it at about one shilling and three halfpence per pound. One of the chief theoretical objections to its use arises out of the fact that the double sulphocyanide of ammonium and silver, formed in the process of fixing, is decomposed by the addition of water into sulphocyanide of ammonium and sulphocyanide of silver; the latter salt not being soluble in water, some traces of it are probably left in the print. This is, however, a point which will probably be decided better by practical experience than theory. We have prints in our possession, fixed with sulphocyanide of ammonium, and some fixed with sulphocyanide of potassium, eight months ago, perfectly free from all signs of fading or decomposition. This fact furnishes an argument in favor of sulphocyanides as fixing agents. Their stability, and the little danger which exists in their use of the liberation of any sulphuretting agent, and several other arguments, are strongly in favor of giving them a fairer trial than they have yet received. We hope, during the coming year, the subject will receive all the attention it deserves.

In connection with printing, the subject of weak silver baths has excited considerable attention. For some years past, until recently, a strong feeling has prevailed in favor of strong printing baths. A variety of good arguments in their favor exist, and it has been rightly held that they give greater certainty of good results than weak baths. An inquiry has been made during the year as to whether this certainty might not be obtained with a less expenditure of silver, and in many practical hands an answer seems to have been obtained that it might. We now find many extensive practical printers using thirty or forty grain baths, who, until recently, used seventy or eighty grain baths, and as they declare with equally good results. We here simply note the fact without entering into the general argument, which is too wide a subject for treatment in a glance at the year. The same remark is true of the proposed addition of nitrate of soda to the printing bath, and of Mr. Anthony's proposed bath of oxide of silver, dissolved in a solution of nitrate of ammonia. They are subjects which demand more full and careful consideration.

Carbon printing processes have made some progress, especially in the printing-ink process of M. Pouncy. In this process we have well marked gradation and half-tone in photographs obtained direct from the negative, the image being composed of printing ink. This in itself is a startling and important fact. That improvements in detail are desirable, in order to secure pleasing and artistic prints, is doubtless true; but it is equally true that these improvements are in progress, that there is much to hope for from the process. M. Poitevin's new principle in carbon printing is also important. Instead of rendering a soluble substance insoluble by light, he works in the contrary direction. Carbon being mixed with gelatine is spread upon paper, is then rendered insoluble by the action of perchloride of iron and tartaric acid. The action of light upon such a film is to render it insoluble, and when exposed under a transparent positive, the lights are rendered soluble in water, and the half-tones become soluble in just such proportion as they have been acted upon by light. In this process M. Poitevin sees a better mode of obtaining half-tone than by the reverse method before adopted.

In photo-engraving the process of Mr. Dallas is the great fact of the year. The present number contains a specimen of the process and some remarks thereon. Photo-lithography has progressed rather in the extent of its application than in any special point of practice. Mr. Lewis has contributed some valuable hints on the subject to our pages. In France, two or three processes have been invented and patented. Two of these, one by M. Morvan, and the other by M. Marquier, are nearly identical in principle, and so far as we understand them, in no essential point different to the method of Messrs. Cutting and Bradford, patented in this country several years ago. Mr. Osborne is in Berlin experimenting for the improvement of his own process, and some of the specimens we have received from him are as delicate and perfect as subjects in line well can be.

In the wet collodion process there has been very little change; bromo-iodized collodion and iron development are almost universally used. Iodized collodion with pyrogallic acid and formic acid developer, as used by Mr. Claudet, has attracted some attention, as yielding very rapid results, but the process does not seem to have superseded that in common use to any extent. The double sulphate of iron and ammonia, originally proposed as a developer in our columns, has come into considerable and satisfactory use. The method published by Mr. Blanchard, of using a weak solution of iron with an equal part of citric acid, for intensifying, has been largely adopted.

Enlarging processes have been steadily improving. Mr. Stuart has, by his improvement in the solar camera, materially reduced the time of exposure for direct sun printing. Mr. Sydney Smyth has by the use of a tinted paper, and by the occasional use of a modified plan of development, been enabled to get very artistic and fine results by development printing. And Mr. Aldis has succeeded in applying the oxhydrogen light in solar camera printing with great success.

An important question in the economy of the art

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has received considerable attention during the year, we mean the recovery of silver from waste solutions and residues. It would form a very startling calculation, if it could be made with approximate correctness, to estimate the thousands of ounces of precious metal which have been thrown into the sewers, there to form an argentiferous lining, where it is gradually thrown down as sulphides, carbonates, chlorides, and other insoluble salts, or to be swept away into the rivers, and finally to the ocean, and form an immense bath of iodide, bromide and chloride of silver dissolved in sea water. Attention has at length been called to the importance and economy of recovering the silver from this waste. As only two per cent of the silver used in its preparation is found in the finished print, it is but reasonable to suppose that a very large proportion of the original expenditure in silver may, by judicious care in collecting residues and recovering the metal therefrom, be saved from waste.

The applications of photography have been extending, in its use for ornamental purposes of various kinds, for book illustration, &c. In some instances the illustrations given are worthy of the art, but in too many instances we have to regret the use of poor, coarse, hard reproductions, in the place of good photographs.

The discovery of certain pictures, alleged to be photographs, produced during the last century, has excited much attention and much discussion, the details of which have been recorded in our columns. The subject is still open, and will shortly be further debated, when we hope evidence sufficiently definite to warrant a satisfactory decision will be forthcoming. The matter will be duly reported to our readers.

The Copyright Act, intended for the protection of the property of photographers in their own productions, has repeatedly been enforced during the year; and although the decisions in some instances have been far from satisfactory, there can be no doubt that the Act has put a serious check upon piracy.

The rage for card portraiture appears undiminished, and the quality of the pictures of this class has on the whole become decidedly better. The production of landscapes in large sizes has not been so extensive, the cabinet size of about 7 inches by 4½ inches, introduced by Mr. Wilson, having become a very favorite size.

Abroad photography appears to be progressing, several new societies have been established and journals published, in countries which had been hitherto almost destitute of photographic literature. In this country, societies in the provinces appear to be somewhat on the decline in numbers and activity, but prosperous in London. The literature of photography has received various additions, and the appliances of the art various minor improvements, but not such as require comment here. The exhibitions of the year have been more excellent in contributions than remunerative in result.

The present year opens with every prospect of activity and prosperity in photography, and we wish each of our readers their full share of all the prosperity which is, we hope, awaiting the future of the art.

The Value of Dead Horses.

Some people will no doubt be astonished to learn that large fortunes have been made every year since the commencement of the war, out of the dead horses of the Army of the Potomac. The popular idea is that when Rosinante yields up the ghost, she is buried in some field, or left to molder into mother earth in the woods somewhere. Not so. She has made her last charge and gnawed her last fence rail, but there is from $20 to $40 in the old animal yet. A contract for the purchase of the dead horses in the Army of the Potomac for the ensuing year, was let a few days ago, to the highest bidder, at $1 76 per head, delivered at the factory of the contractor. Last year $60,000 were cleared on the contract, and this year it is thought $100,000 can be made on it. The animals die at the rate of about fifty per day, at the lowest calculation.

At the contractor's establishment they are thoroughly dissected. First, the shoes are pulled off; they are usually worth fifty cents a set. Then the hoofs are cut off; they bring about two dollars a set. Then comes the caudal appendage, worth half a dollar. Then the hide—I don't know what that sells for. Then the tallow, if it be possible to extract tallow from the army horses, which I think extremely doubtful, unless they die immediately after entering the service. And last, but not least, the shin-bones are valuable, being convertible into a variety of articles that many believe to be composed of pure ivory, such as cane heads, knife-handles, &c.

The Silk Manufacture in Paterson.

The Paterson *Daily Press* has an interesting article presenting the statistics of the silk manufacture in that city. The silk consumed is chiefly from China or Japan, and the fabrics produced are coat and other linings, flags, plain goods, braids, a combination of silk and mohair, ribbons, neck-ties, sewing twist and floss silks, fringes, embroidery, silks, &c. The *Press* claims that Paterson is the head-quarters of the silk manufacture in America, and has the prospect of two new first-class establishments, which will make the silk industry of Paterson equal that of all the rest of the United States. The total number of operatives employed is 1,025, exclusive of officers in charge. Three-fourths of the operatives are females, and children of very tender years are also employed. The lowest rate of wages is one dollar a week to learners, and from this point rises to $4 for females, and $5 and $5 50 a week to males—the average wages being $3 a week. The total amount paid out to operatives per annum is about $150,000.

Versatility of American Soldiers.

There are two mills which supply our troops at Pulas, Penn., both steam flouring and saw mills. They are under the superintendence of Captain W. H. Hill, 81st Ohio, a practical miller and driving business man. In less than a month, during half of which time only one mill was running, he has furnished to Captain Carpenter, Commissary of Subsistence, over 100,000 pounds of flour. This has been done, too, by grinding usually only at night, the saw being run during the day. It is a novel sight to go through these mills. How perfectly at home are our sturdy sergeants, corporals and privates, all covered with dust and flour, as they walk about the mill on their various duties. The ease with which our troops adapt themselves to anything is a matter of surprise to the natives of Tennessee. Yankee labor is so manifestly superior to that which has been employed heretofore, that they actually want the troops to continue to run the mills. The thrift and enterprise displayed by our men make decided impressions on the people in favor of free labor.

MISCELLANEOUS SUMMARY.

The Screw vs. Paddles.—The R. M. S. *Asia* and the screw steamship *City of Edinburg* recently left the Mersey in company, went into Queenstown together, left again within a few minutes of each other, and continued in company on the western passage for a period of five days, when the wind drawing ahead, the paddle ship shook off the screw steamer, and went on her way rejoicing. It will be seen that the screw ship was a match for her side-wheel consort so long as the wind was favorable, the great spread of canvas of the former in comparison to what the latter could show enabling her to keep way with and even to go ahead of the *Asia* during the day, while the breeze was strong; but as the wind almost invariably lulls after the sun goes down, the screw would always be several miles astern when daylight made its appearance.

The Home Journal.—One of the most popular family journals published in this country is the *Home Journal*, edited by George P. Morris and N. P. Willis, Esqs. The wide celebrity which this paper has attained is a sufficient proof of its popularity, and we are happy to know that its circulation is increasing most rapidly. Not the least attraction in a mechanical point of view is the elegant new dress with which it challenges public admiration for the coming year. Mr. N. P. Willis devotes his exclusive industry to the *Journal*, and is aided by numerous accomplished contributors.

The New York *Tribune's* Morris Island correspondent says the rebels have in Charleston harbor two iron-clad steamers, of close imitation to the *New Ironsides* and *Dunderberg*.

There were surveyed at Bangor this year 188,122,047 feet of lumber, which was thirty millions over last year, and fifty millions over the year before.

Oil Cake.—This cake, on which cattle are fed, is nothing more than vegetable oil seeds, which have been crushed for manufacturing purposes. The spurious nuts, which grow on the top of the palm-tree, are crushed at Harburgh, on the Elbe, and the oil extracted from them is converted into a toilet soap, which is largely consumed in Germany. The crushed nuts are exported to England as oil cake for cattle. The crushed seeds of the poppy form a valuable oil cake, as it causes that tranquility and sleepiness which conduces to the rapid growth of young cattle. Walnuts are crushed extensively in France to extract a juice for culinary purposes, and the crushed nuts form a useful oil cake, but it gets rancid too rapidly to be of use when exported. Oil cake is also formed from crushed doddor, sesame and cotton seed.

The best English railway engineers mention that a coal line, to be successful, must be capable of being worked at moderate speed, and without interference with other traffic. This is indispensable. If coal trains of forty or fifty trucks, each containing four or five tuns of coals, are to be drawn at high speed, or are to be shunted at every other station to make way for fast trains, the result must be such additions to the cost of working as must preclude the possibility of railway coal traffic being worked in successful competition with the sea coal trade.

Sugar Consumption.—The total quantity of raw sugar, foreign and domestic, consumed in the United States during 1863, was 284,308 tuns, against 432,411 tuns in 1862—showing a decrease of 148,103 tuns. Cuba supplied the greatest quantity of any other foreign country, the amount being 137,232 tuns, received at New York. The quantity of maple sugar raised last year was about 25,000 tuns.

A nice sofa is thus described by an exchange:—"it is formed of solid clear blue ice, and is embellished with numerous fine pictures frozen in upon the back, the seat and the arms of the sofa, appearing as if they had grown beneath the surface of the transparent material."

The metal called Vanadium, discovered in English pig iron, is used in the preparation of writing ink. To a solution of nutgalls is added a minute portion of vanadic acid, and the ink thus obtained is intensely black and indelible by the ordinary agents which destroy the color of the ink in common use.

Cheap Coal Gas.—In the city of Liverpool, Eng., the price of gas has been reduced to about 86 cents per 1,000 cubic feet. It is also stated that this price pays a fair profit to the stockholders.

[It is much cheaper in the "Confederacy," for although it costs $25 for the same amount, the money is paid in paper which is worth nothing at all.—Eds.

A Frenchman has patented an invention for pulverising the refuse of slate and mixing it with some substance, which produces a most durable material and which answers the same purpose as some kinds of our most valuable stone.

Most of the Continental postage stamps which were formerly illustrated with the likenesses of the rulers, have now the arms of the countries substituted instead of the heads, which are no longer of any value.

At 25 minutes to 3 o'clock, Dec. 19, one of the heaviest earthquakes was felt that San Francisco has shivered under for many years. The earthquake was felt with violence at Santa Clara and San J se.

The Boston *Traveler* says the Androscoggin mill is the finest cotton mill in the world. It is not the largest, but among the very largest, its capacity being 45,000 spindles, and it gives employment to 1,200 operatives.

Calicoes.—The Providence (R. I.) *Journal* states that the transactions in that city during the past year in print cloths were 3,922,800 pieces against 3,616,400 in the previous year, being an increase of 306,400 pieces.

The daily product of coal at Cannelton, Ky., is 10,200 bushels, which, at fifteen cents per bushel, the price paid, makes $1,520 per day, or $474,800 per annum.

American oysters have been planted at Havre, France, they being considered superior to the native bivalve.

Professor Agassiz has begun a course of lectures on the Glacial Period, at the Smithsonian Institution.

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GOVERNMENT ORDNANCE EXPERIMENTS.

[OFFICIAL.]

Practice at Iron-Plate Target No. 38.

FACED WITH WOOD ON THE PLAN OF MR. HEATON.

PENCOTE BATTERY, May 28, 1863.

This target was made of one 4½-inch scrap-iron plate, backed by 20 inches of solid oak and faced with 12 inches of oak on the plan of Mr. Heaton. The plate was joined to the rear timber with four wood screw bolts, and the facing timber was secured to the rear timbers with six square-headed bolts with nuts. The target was placed against a bank of solid clay.

DIMENSIONS OF TARGET.—Plate 4 feet long, 4 feet wide, 4½ inches thick. Rear timber 20 inches thick. Facing timber 12 inches thick.

Gun XI. inches, No. 214, A. F. Charges, cannon powder. Projectiles, solid cast-iron shot, ⅔ Clover-dale iron and ⅓ Hopkins iron. Officer in charge, Lieut.-Commander Wm. Mitchell. Record by Hughes.

No. from Gun.	No. to-day.	Charge.	Weight of Projectile.	Insertion	Recoil.	Time Fired.	Distance to Target	REMARKS.
		lbs.	lbs.	in.		P.M. h.m.	ft.	
167	1	30	163	106	Taut Breech.	4.8	90.2	

Shot struck 16 inches from top edge, 17 inches from lower edge, and 16½ inches from right and left hand edges of target, passing clear through the facing timber, plate, and rear timber, and imbedding itself 6 feet 3 inches in the bank in rear of target. Diameter of hole in iron 15½ inches.

The top and middle courses of facing timber were completely shattered, and the whole of the top course, and a portion of the middle course carried away; the bottom course was somewhat fractured, two of the timbers were thrown forward and fell 30 feet in front of target. The rear timbers were all completely shattered.

One piece of the iron plate was found 102 feet in front of target.

One bolt on the top left-hand side of target had its head broken off, and the top right-hand bolt had its nut broken off in rear and forced out in front. None of the wood screw bolts were broken nor started from the surface of the plate.

Indentation of plate on top edge of shot hole ⅞ inches, on lower edge ¾ inches, on right-hand edge ⅝ inches, and on the left hand edge ⅞ inches. The shot was considerably fractured and flattened on its forward face, but retained its spherical form until it was taken from the bank.

W. MITCHELL,
Lieut. Commander U. S. N.

The Parrott Guns before Charleston.

Some facts relating to this weapon, now, it would seem, the principal reliance of the Government as a rifled cannon, are thus related by a correspondent of the daily press:—

An experiment is being tried with the 300-pounder Parrott guns, to see how many shot they can throw without bursting; so one that is mounted in Fort Strong has thrown 500 shells, one every ten minutes, directly in the heart of Charleston, without showing any signs of giving way about the breech or any other part. The orders are to fire until it bursts, and as the gun is sighted for Charleston, every time there is some chance of some one getting hurt over there.

Only Forts Putnam and Chatfield, on Cummings Point, are engaged in the bombardment. Experiments have been made to test the power and endurance of the 300-pounder Parrott guns. From one of these, fired at intervals of five minutes for 67 consecutive hours, up to Jan. 14, at sunset, 562 shots were aimed at Charleston, of which all but about 40 fell within the city limits. The elevation of this gun is 40 degrees, the charge of powder 3½ pounds. This is the severest trial that a Parrott has been subjected to. At 35 degrees the shells fell into the city. At 40 they must go beyond the burned limits.

Another Parrott gun of 100 pounds caliber has been trained at the same elevation of 40 degrees, and with a charge of 10 pounds of powder three test-shots were sent into Charleston yesterday. It is believed that the gun will stand this severe usage.

The obstructions of the channel are certainly gone—swept away by the tides and currents, aided by the rough seas of the winter season. Visible upon Fort Sumter are six links of the chain that was stretched from the work to Fort Moultrie.

Ice-Making Machines in demand.

The Philadelphia *Press* has the following in relation to this subject:—

"If, in the face of the abundance of ice, the prices be kept up—few, we suppose, will have the impudence to think of raising them—Science must be resorted to to produce the article artificially. It can be manufactured now, with the aid of steam power, by evaporating ether or any other similarly volatile liquid *in vacuo*, and again condensing the vapor to liquid, so as to be used afresh. By such a machine, 20 deg. Fah. below zero (52 of cold) can easily be obtained. Now, as water in ordinary cases freezes at the degree of heat marked 32 on Fahrenheit's thermometer, the machine readily produces ice. By its means ice is made nearly under the equator, in Peru, where previously ice had never been seen, and the British Government employs these machines in India and the Cape of Good Hope, for the use of troops in the hospitals. At Calcutta, the machine-made ice is driving the imported Boston ice out of the market, and seriously threatens the extinction of the large and profitable ice importation from America, established by Mr. I. Tudor, of Boston, over thirty years ago. In large cities, such ice-making machines (producing ten tuns a day, with ease,) might be worked by companies, or even by private persons, at a profit, with prices what they have been of late years.

What is needed, however, is an apparatus, at once low-priced, simple, speedy, and effective, which may be used in every house. The French firm of Carre & Co. showed such a machine in the London Exhibition of 1862. It produced ice of such perfect purity that pieces of it could be put into the drink that is to be cooled—solid, transparent ice, without any sponginess. As the volatile liquid used is only the aqueous solution of ammonia, the cost of making it is very slight. The machine is sold in London as low as $20 each, for the smallest machine, and it was estimated that it might be supplied on even lower terms, if manufactured largely. The cost of ice thus produced was far below what we paid, in this city, last year. We only wonder that in this country, where the price of ice has lately gone up so greatly, some ingenious inventor has not discovered a cheap and effective process, for use in all ordinary dwelling-houses, by means of which every family might be self-supplied with ice, at a reasonable rate. If prices keep up, after the large natural supply of ice this winter, we shall probably have the French machine introduced here, of course with improvements. If ice continues dearer than bread, every house will have its own ice-making apparatus."

Fig. 1.

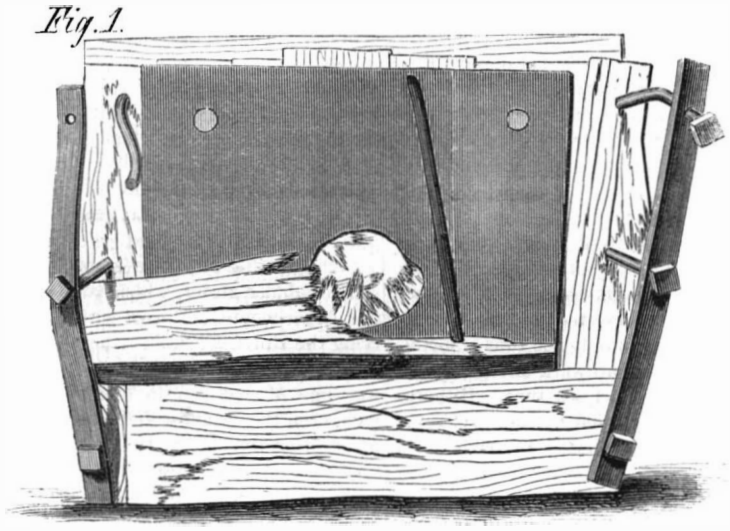
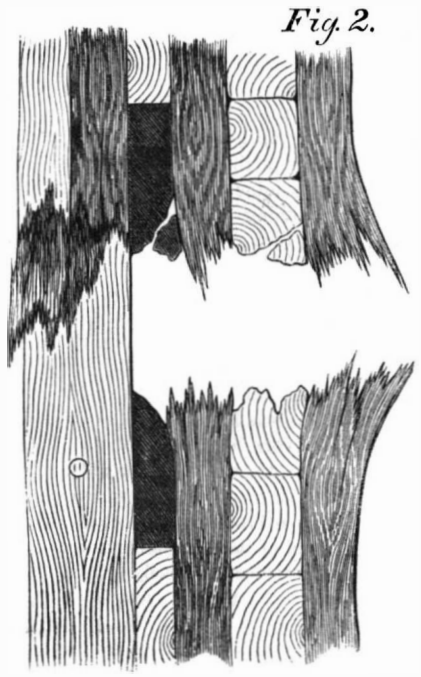


Fig. 2.



Advantages of Wedlock.

None but the married man has a home in his old age. None has friends, then, but he; none but he knows and feels the solace of the domestic hearth; none but he lives and freshens in his green old age, amid the affections of his children. There is no tear shed for the old bachelor; there is no ready hand and kind heart to cheer him in his loneliness and bereavement; there is none in whose eyes he can see himself reflected, and from whose lips he can receive the unfailing assurances of care and love. He may be courted for his money; he may eat and drink and revel; and he may sicken and die in an hotel or a garret, with plenty of attendants about him, like so many cormorants waiting for their prey; but he will never know the comforts of the domestic fireside.

The guardians of the Holborn Union lately advertised for candidates to fill the situation of engineer at the workhouse, a single man, a wife not being allowed to reside on the premises. Twenty-one candidates presented themselves, but it was found that, as to testimonials, character, workmanship, and appearance, the best men were all married men. The guardians had therefore to elect a married man.

THE rolling stock of the railways of Great Britain consists of 6,400 locomotives, 15,366 passenger carriages, 5,937 other carriages attached to passenger trains, 187,000 merchandise cattle, and mineral wagons, and about 5,000 carriages of other descriptions. In all it consisted, on the 1st of January last, of 219,522 vehicles—a number which, if they were linked together, would reach from one end of Great Britain to the other.

IT costs the New York Third avenue horse railroad 62½ cents a day to feed its horses, but Boston keeps its city horses for 41 cents. The feed in both cases is about 17 pounds of corn meal and 13 pounds of hay for each horse a day, with 7 pounds of rye straw for bedding.

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PROGRESS OF ENGINEERING SCIENCE.

[Concluded from page 53.]

Among the various contrivances which have been introduced to assist in rendering the great ocean available as a highway to the nations, none are more beautiful than the lighthouses that crown the headlands of every maritime county, or point out the dangers of the mid-ocean. Those that are erected on the shore, too often, it is true, partake of the absurdities of modern shore-going architecture in general. There are Grecian and Gothic lighthouses, and even Egyptian towers, that would fain cheat us into the belief that they belong to long past ages; but even then we forget these absurdities in contemplating the beauty and perfection of their photogenic arrangements. These have occupied the attention of some of the ablest scientific men of modern times, and they now send their rays through the darkness with a space-penetrating power that a few years ago would have been deemed impossible, and vary or alternate them with a steadiness and precision that has given confidence to thousands, and saved many a storm-tossed vessel from destruction.

To Smeaton is due the honor of having fixed the form of the best class of these structures; and even now the Eddystone remains a model which has hardly been surpassed. Nothing could exceed the patient ingenuity with which that great engineer mortised his tall tower to the wave-worn rock, and then dovetailed the whole together, so as to make rock and tower practically one stone, and that of the very best form form for resisting, or rather for deadening, the action of the waves. The Bell Rock of the elder Stevenson, which succeeded this, is taller, and even more graceful, but its foundation was larger, and the difficulties far less. The Skerryvore lighthouse of the younger Stevenson surpasses both, whether in beauty of construction or grace of form, and would excite equal admiration for skill in overcoming difficulties, were it not that it is the third of its class, and the work was lightened by the experience previously gained.

It is to be regretted that these structures are generally placed so far at sea that they are very little seen, for they are, taken altogether, perhaps the most perfect specimens of modern architecture which exist. Tall and graceful as the minaret of an Eastern mosque, they possess far more solidity and beauty of construction; and, in addition to this, their form is as appropriate to the purposes for which it was designed as anything ever done by the Greeks, and consequently meets the requirements of good architecture quite as much as a column of the Parthenon.

In early times nations were content—as they are in most parts of the East now—with such loads as could be carried on the backs of beasts of burden. Long strings of camels or mules, or droves of bullocks, wandering over the half-cultivated plains, sufficed for all the rude wants of the Phoenician epoch. The Romans, living in a more closely cultivated country and with a more extended empire than had previously been known, seem to have been the first to think of employing wheeled carriages for purposes of transport, and consequently the first who deemed it necessary to make permanent roads or to build bridges.

In those days, however, the mechanical branch of the profession was so immeasurably behind that which we now designate as civil engineering, that the professors of the latter were content to effect by brute force what we now accomplish by infinite scientific contrivance. They drove their roads straight as an arrow up hill and down dale, and paved them with blocks of stone, that not only must have enormously increased the friction, but must have tended to destroy any wagon not provided with springs, and have required a Roman's power of endurance to survive a journey long upon them.

In order to understand this, it is necessary to bear in mind that the resistance to a load drawn along a road is made up of two parts, friction and weight. No human ingenuity has yet succeeded in taking one ounce off the weight, though by distributing it over a very long surface, by means of low gradients, it may to a certain extent be rendered practically innocuous. All our skill has been applied to the task of getting rid of friction, and on our railroads we have so far succeeded as to diminish the relative importance of these two elements to an extent never before dreamt of. An active horse, for instance, will draw a cart, weighing a tun, with tolerable ease along a well-made level road; and when he comes to such an incline as shall require a tractive force equal to what would draw two tuns on a level, he can double his power for a short distance, and overcome it. The same horse, however, will draw ten, or even thirty tuns along a perfectly level railway; but a very slight incline will double this, or require the exertion of ten to twenty times greater force to lift the train up the incline than what is required to move it on the level, and no horse could even, for a few yards, accomplish this. Indeed, up some such inclines as the locomotive now climbs he would require to put forth the power of 100 horses to lift the train while the friction remains constant at 1-horse power. With the Romans, all this was reversed. Clumsy mechanical arrangements made friction the element to be overcome; so much so, that it is difficult for us to understand how a four-wheeled plaustrum, without a perch, was ever coaxed round a curve—how it turned nobody knows—and with the rude wheels keyed on to the axles, as was generally the case in baggage wagons, and without grease, the friction must have been so enormous that a slight addition to the lifting power required by a steep incline must have been of comparatively little consequence. Where pack saddles are used this is even more apparent; the load a horse can carry on its back is so small in proportion to its tractive power, that the steepness of the road is of comparatively little consequence.

Long before great bridges were erected, it had occurred to engineers that iron might probably be employed in building bridges. As early as 1775, Mr. Pritchard built one at Colebrook Dale, 100 feet span, and in 1795 Thomas Wilson erected one at Sunderland, 237 feet clear span, with only 260 tuns of metal, while the center arch of Southwark Bridge, only 3 feet more in width, contains 1,665 tuns. Hitherto these two have not been surpassed by any arches of the same kind; but Telford proposed to replace old London Bridge with one of a single arch, 600 feet span, and afterward begged to be allowed to span the Menai Strait with one of nearly the same extent. More recently Mr. Page proposed to cross the Thames, just above the Tower, with a single arch of 750 feet clear span, to carry two lines of rails and a roadway 24 feet wide, besides footways. Bold as the project may appear, still Mr. Page's experience and admitted knowledge of the subject are such that no one doubts its feasibility. From various causes none of these great schemes have been carried out, though there seems no reason to doubt that they might have been executed with success. As the resistance to pressure in cast-iron is as nearly as may be ten times that of stone, there seems at first sight no reason why an arch of iron, 1,000 feet span, should not be made as easily with the same weight of material as one of 100 feet of stone; and as blocks can be cast with more precision than they can be hewn, and fitted with flanges and other constructive expedients, even the most gigantic arches ought to be far easier to build in this material. The one element of uncertainty is the contraction and expansion of the metal from heat; but there seems little cause to fear it.

On the Continent, where scientific knowledge is generally in advance of practical skill, they have carried this principle to excess, by using wire, which is iron in its most perfect form, for tenacity. This has reduced the weight of the bridge so much relatively to the load, as to render the undulation excessive, and frequently to lead to the most frightful accidents. Still the bridge over the Sarine at Friburg has stood for thirty years, with very slight repairs, though its span is 870 feet, while that of the Menai Strait is only 570, and the bridge which recently crossed the Thames at Hungerford Market, which is our largest and typical example of the class in England, was only 676½.

The boldest and grandest application of this principle is the bridge constructed for railway traffic by Mr. Roebling, just below the Falls of Niagara. So rapid has been the progress of engineering science, that if any one had proposed, twenty years ago, to throw a railway bridge over a chasm 800 feet wide, and 245 feet above such a foaming torrent as that of the Niagara, he would have been looked on as a madman. Yet this has now been accomplished, and by very simple means. The bridge consists of a rectangular tube 20 feet deep by 26 feet wide, or rather two floors 18 feet apart—the upper carrying the railway, the lower the roadway for ordinary traffic. These are connected together by a series of wooden posts, braced together by diagonal iron tie-rods. By bracketing out from the rocks, the free length of the tube is reduced to 790 feet, and is then suspended from towers 821 feet apart from center to center by four wire cables of 10-inch. section, and each containing 3,640 separate wires. These are further assisted by numerous braces radiating from the towers, and a multitude of ingenious minor contrivances.

When a train weighing more than 300 tuns passes over the bridge, the deflection is said to be only 10 inches; and certain it is that, so far, it has answered all the purposes for which it was intended; but nevertheless it seems too frail and fairy-like a structure for the rough usage of railway traffic, and trains are not allowed to move across it at a higher velocity than a man can walk. With great care and continuous repairs it may do its work for years to come, but it may any day deposit its load in the boiling flood beneath, and so again separate the provinces it has so boldly united. Indeed, taking it altogether, there can be little doubt that the tubular girder proposed by Robert Stephenson for the same purpose would have been a better piece of engineering. It would have cost more in the first instance, for if the published accounts are to be believed, the suspension bridge cost only £100 per foot forward; but the durability of the tube would have been practically unlimited, its safety undoubted, and an occasional coat of paint all the repair it would have required.

Perhaps, after all, there is nothing better than the simple tubular girder, which was evolved out of the first experiments, and used with such success in carrying the Holyhead Railway across the Menai Strait. The first and most obvious proposal for this bridge was one of cast-iron in compression, which would have been the cheapest and most architectural mode of effecting the object; but the Admiralty interfered, and insisted that a clear headway of 100 feet above high water should be maintained throughout. To meet this difficulty a tube suspended by chains was then suggested, nearly similar in principle to the one recently erected at Niagara; but as the investigation proceeded, it was found that the chains might be dispensed with, if a tube of sufficient rigidity could be constructed to carry any railway train across the greatest opening, which here was 460 feet clear. So complete were the investigations, and so careful the execution of the whole work, that subsequent experience has added little to the knowledge then attained; and, besides being the first, it is, considering the difficulties of the execution, one of the most perfect works of its class. In extent, and in some respects, for cleverness of execution, even this bridge is surpassed by that across the St. Lawrence, at Montreal, which, though only a single tube, is 6,592 feet long; but the center span is only 330 feet, and the remaining 24 openings average 242 feet. The great engineering difficulty was the erection of such a structure on so rapid a river, frozen at times, and at the breaking up of the ice bringing down great bergs, which threaten to overwhelm everything. All these difficulties have been successfully surmounted, and the bridge promises to be as stable as it is efficient.

The Bhore Ghat incline, which has just been completed on the line from Bombay to Central India, is 15¾ miles in length, and the height surmounted is 1,831 feet, so that the average is 1 in 48, or about the same as the Semmering; but for one mile and a half it is 1 in 37, and for eight miles 1 in 40. The amount of tunneling, bridging, and embanking on the Indian line is such that the cost was £1,100,000, or upwards of £68,000 per mile.

The Americans work some inclines with a steeper gradient than even these, but never so long or of so permanent a character. But it is now proposed to cross the Simplon by a railway, and before long Innspruck will be connected with Verona, so that it can hardly be said that any mountain chain which has been traversed by roads is inaccessible to the steam horse. Even the Himalayas might be so traversed; and if a hundred years hence some unborn Brunel be called upon to make designs for the Lahore and Lanak Junction Railway, and find himself forced to tunnel through the ridge, it will not be that the engine could not climb a pass even 18,000 feet above the level of the sea, but that the perennial snows of those regions

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would form so unsuitable and so unsatisfactory a foundation for his permanent way.

Not only is it easy to converse with every important place in England, but messages can be sent to every capital in Europe, and answers received in an incredibly short space of time. Once it was possible to communicate with America, and it probably will be so again before the year 1864 changes its index. Already the Atlantic Telegraph Company have received tenders from eight different firms, any one of which is competent to the task, and some of these tenders are so favorable that one of them will, no doubt, be accepted; if so, London and New York may be within speaking distance again before twelve months are over, and this time with every chance of their connection being permanent, so great has been the improvement in the manufacture of submarine cables, and so extensive the experience of the mode of laying them. While this is being debated, a cable has left England which is destined to unite Calcutta with London, and which, in all probability, will accomplish this object ere long. But communication with any point on the North American coast must embrace also New Orleans and the whole of that continent. Our communication with Calcutta extends by an easy link to Singapore, and from Singapore to Canton and Batavia; and from the latter place there is no difficulty in reaching the Australian continent. It may thus be that before many years are over we may see recorded in the morning's *Times* events that happened at Sydney, or Shanghai, or San Francisco, on the previous day. Surely this is a wonder and a triumph of scientific skill if anything ever was; and surely the men who do these things are giants!

AMERICAN DENTISTRY—PROCESS OF SETTING TEETH ON INDIA-RUBBER PLATES.

While in conversation recently with a small knot of intelligent persons, the subject of artificial teeth and dentistry engaged our attention, when one of the parties related a case in connection with himself, which evinced the superior skill of American dentists. He stated that while he was residing in Glasgow, Scotland, for a few months during the summer of 1861, he went to a dentist in that city for the purpose of having three artificial teeth secured in his upper jaw. While they were being fitted he informed the operator that he was about to return to the United States, when the dentist said, "Well, these very teeth came from America. We get all our artificial teeth from Philadelphia." The three teeth were supplied, and although apparently neatly fitted, our friend never felt easy while he used them; and soon after he arrived in New York they were removed and their places supplied by an American dentist with a new plate and teeth, which have never given him the least trouble.

American dentists stand at the head of their profession, and in the preparation of teeth and plates our artists are unrivalled. Formerly all artificial teeth were secured on plates of gold, but within the past four years that remarkable substance, "hard india-rubber," has taken the place of the metal in many cases, and its use for this purpose is extending. When gold is at such a high premium, the employment of a cheap, suitable substitute in dentistry is of no small benefit to the community. The artificial gums and plates of hard india-rubber in which sets of teeth are now made by dentists are very beautiful. They are of a light cinnamon color, and are hard, light and smooth as polished glass. Much skill and a considerable amount of science are involved in the manufacture of such rubber plates with sets of teeth. The whole of the operations and processes in connection with their manufacture have been shown and explained to us, at our request, by William C. Horne, a young and skillful dentist, of Fourth street, Brooklyn, E. D., and we will describe the method of taking the impressions, and fitting, making and finishing the plates ready to be applied to the mouth of a patient. We may, however, explain that what are called "temporary sets" of teeth are very often made and applied to patients before sets intended for permanent use are made; but our intention is simply to describe the manufacture of full "permanent sets:"—

After the patient's natural teeth have all been extracted, and the gums have become sound and properly set, the first task of the dentist who is to provide a set of artificial teeth is to take a cast of the gums and the roof of the mouth. Two instruments called "impression cups," are used for this purpose. They are composed of metal: the one for the upper jaw being formed like the hollow part of a horse's hoof, is designed for taking an impression of the upper jaw and the roof of the mouth; while the other one, for the lower jaw, is formed simply with a semicircular channel to take the impression of the lower gums. Some plaster of Paris in a soft state is put into the upper impression cup, which is placed in the mouth and pressed against the upper jaw. The plaster soon takes a set and becomes hard; when this is effected the cup is withdrawn. The plaster now contains the negative cast of the upper gums and the roof of the mouth. The lower cup is now charged with plastic bees-wax (which adheres to it), then it is laid over the lower gums in the mouth, and receives its impression at once. Plaster of Paris is perhaps the best substance for taking an accurate cast, but as the lower impression cup has to be inverted, wax is more convenient to use for taking an impression of the lower gums.

The impressions taken of the gums are next varnished and oiled for the purpose of taking positive casts from them, called "the model," to represent the natural gums. These are made by taking casts in plaster from the molds in the impression cups. After the models are taken, to obtain the size and form of the gums and roof of the mouth, the next object is to get the thickness of the plate for the teeth. This is called the "trial plate," and is made either with plastic gutta percha or bees-wax, which is carefully built on by the dentist with his fingers and a proper instrument, upon the model, to the hight judged according to the length of the patient's teeth and the natural position of the jaws. This part of the process must be performed in a very skillful manner.

The trial plates are now taken from the model and tried upon the patient. A true perpendicular line is then drawn through the center, toward the chin, of both jaws, and marked on the plates, and a cross mark is also made at each side on the plates, where the jaws come in contact. After this these test plates are taken and put upon the models, which are then placed in an instrument called "the articulator." In form it is almost like two shallow cups, secured by a joint, to represent the upper and lower jaws of the face. The articulator has three movements regulated by screws. One movement is up and down, the second lateral, and the third back and forth. The object and use of the articulator is to get the true position of the patient's jaws, and the natural distance between the teeth. Considerable judgment must be exercised in its use, as in order to secure the capacity for eating with artificial teeth, they must be set somewhat closer than natural teeth. The length of time between the period when the teeth were extracted and the new set fitted, must be taken into consideration.

The next operation is to select the teeth for the set, and they must be of such a size as will suit the patient's mouth and cast of countenance. Elderly persons should not desire what are called "white, pretty teeth," as these are only suitable for young persons. Artificial teeth for permanent rubber sets are prepared by dentists, in blocks of three for the sides and in blocks of two teeth for the front. For temporary sets and for gold plates, the blocks are of single teeth. A full description of the manufacture of artificial teeth was published on page 341, Vol. II, Scientific American (current series). Those for rubber sets have metallic pins on their base with heads upon them.

After a suitable number for a set has been selected they are placed on the trial or test plates of wax, and the joints are ground to make good junctions, both the upper and lower sets being prepared at the same time. When accurately arranged the teeth are secured in position on the trial plate with soft wax, then they are tried in the mouth of the patient to obtain perfect articulation, which being effected, they are next secured upon the model with soft wax. It will be understood that the plaster model represents the gums of the patient, and the rubber plates with the teeth in them are to be fitted upon the models of the upper and lower gums. The upper plate extends back upon the roof of the mouth, otherwise the two plates for a set are similar. A description of one, however, will suffice for both, as the operations involved are alike.

The wax of the trial plate upon the model is now made quite smooth to obtain a smooth cast from it of what is called the "counterpart," or the back section of the mold. This cast secures the perfect form and thickness of the india-rubber which is to be applied to take the place of the trial plate, and it is also necessary for keeping it in perfect shape while being vulcanized. The model, with the test plate of wax and the artificial teeth set on it, is now placed in a small iron flask, provided with adjustable screws, and soft plaster of Paris is now poured into the flask, which, when set, forms a cast of the counterpart of the trial plate and model. The space between the plaster counterpart and the plaster model is occupied with the wax trial plate, which forms the measure of the india-rubber to be supplied, and the wax must be removed to give place to it. The flask is next subjected to a gentle heat, opened, and the wax trial plate carefully removed, leaving the teeth and the space occupied by it to be packed with the india-rubber. This article, designed for dentistry, is prepared by the Goodyear Rubber Company, and comes in thin square sheets of a bright red color, said to be effected with the oxide of gold. When exposed to a moderate temperature, the rubber becomes sufficiently plastic to be packed in the mold in the flask, around the base of the teeth, occupying the place of the wax trial plate. It had been found that unless rubber plates had been made very thick, some of them were liable to crack at the bottom of the channels fitting on the gums. To obviate this evil and secure strong and thin plates, Mr. Horne fits a continuous small plate of gold upon the whole ridge of the model, and fastens it with small gold loops, securing it firmly in the rubber. The model and rubber being now packed around the teeth in the flask, the "counterpart" is placed upon it and gently screwed down until the proper thickness and form of the trial plate is produced on the rubber, holding the teeth in it perfectly, and occupying the place of the removed wax. During this operation of screwing down the flask it is kept warm, so that the rubber is maintained in a plastic condition, and any surplus of it is forced out by the pressure of the counterpart upon it, through small vents provided in the flask.

The rubber plates being perfectly molded and the teeth secured in it in the flask, it is ready for what is called the "vulcanizing process." This consists in subjecting the rubber to an elevated temperature in a moist atmosphere, when it undergoes a complete chemical change, becoming hard, inelastic and very permanent in its character. To effect this, the flask containing the prepared rubber plate is put into a small, portable, metallic oven, containing some water, the lid of which is firmly screwed down and a thermometer secured in it to indicate the temperature. The oven is heated either with a gas jet flame or an alcohol lamp, and when the temperature rises to 320° Fah. this heat is maintained for about one and a half hours. The water in the oven generates steam and the rubber is subjected to a moist heat and considerable pressure. As thermometers differ slightly, different dentists may vulcanize with a slightly lower or higher temperature than that specified. While the rubber is heated in the flask, the mold in which it is confined keeps it in perfect shape. The flask is next taken out of the oven and cooled with water, then unscrewed and the vulcanized plate removed with the teeth set perfectly in it. It will be understood that the plate for each set is vulcanized in a separate flask. The plate has now to undergo the finishing operations, and is first filed and scraped with fine tools; it is then ready for rubbing down and polishing. It is next subjected to the action of a hard revolving brush wheel and ground pumice stone; then to the action of a similar wheel and rotten stone powder, and finally to a softer brush wheel and fine whitening. When finished, such india-rubber plates are hard and smooth as polished glass, and are then ready to be placed permanently in the patient's mouth. The artificial teeth appear to be as firmly secured in the rubber as if they had grown in it, and the operations connected with india-rubber dentistry are certainly scientific and ingenious. Gold plates are all soldered to teeth with a blow-pipe, and the metal is swaged in a die. As the rubber is molded in casts of the patient's gums, such plates are more accurate than those of swaged metal. They are also about one half lighter, and many persons prefer them to gold, as they feel more like the natural gums and the roof of the mouth.

We have thus described the method of manufacturing india-rubber plates with sets of artificial teeth.

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There can be no doubt that if they are not so desirable they are really more beautiful than natural teeth. American dentists have achieved a triumph of skill in their manufacture, and have conferred a benefit upon suffering humanity.

Correspondence

Strength of Steam Boilers.

MESSRS. EDITORS :—I do not intend here entering into the causes of the large number of boiler explosions that take place, but having lately read in the daily press accounts of the bursting of several locomotive boilers, it struck me that some simple and general rule by which to ascertain their strength would be useful to all who either make or use them; and especially because, although the general principle herein conveyed is well known, still I have found few, especially amongst practical men, who have any idea of the actual pressure it would be safe to test boilers to. I therefore subjoin a table I have worked out, which shows one-third of the pressure per square inch a boiler one inch in diameter will bear without bursting, and no material should be loaded with a greater strain. For boilers of any size it is only necessary to divide the number of pounds in the table, opposite the thickness of plate used, by the diameter in inches; the result will be the greatest load that ought to be put on a safety valve in pounds, per square inch. The iron used is understood to be of the best quality, with a tensile strength equal to 70,000 pounds per square inch. Although all boilers should be tested to the extent given by the table, they should not be regularly worked up to that pressure, on account of their depreciation by wear and tear, by oxidation and otherwise, which, according to the time they have been in use, will of course proportionately lessen their efficiency.

1-8th-inch plate,	2,500 pounds.
3-16th-inch plate,	3,750 pounds.
1-4th-inch plate,	5,000 pounds.
5-16th-inch plate,	6,250 pounds.
3-8th-inch plate,	7,500 pounds.
7-16th-inch plate,	8,750 pounds.
1-inch plate,	10,000 pounds.
9-16th-inch plate,	11,250 pounds.
5-8th-inch plate,	12,500 pounds.
3-4th-inch plate,	15,000 pounds.

Suppose, for instance, we have a locomotive boiler made of 5-16th-inch plate (their usual thickness) and 45 inches diameter, the table would give 6,250÷45= 139 lb., the greatest amount to which the safety valve should be loaded; whereas another boiler, 35 inches diameter, and the same thickness of plate, would, by the same rule (6,250÷35), bear 178 pounds per square inch, without any extra strain on the iron. If, however, we make the 35-inch boiler of 1-4th-inch iron, we find opposite 1-4th-inch, 5,000, which, divided by 35, gives 143 pounds, showing that 1-4th-inch plate in a 35-inch boiler, will bear more pressure than 5-16th-inch plate in a 45-inch boiler. This also shows conclusively that by making two boilers of different diameters, that have to work at the same pressure, of the same thickness of plate, that either one is too weak, or there is a waste of material in the other.

WILLIAM TOSHACH.

Schenectady, N. Y., Jan. 15, 1864.

Nature and Art---King-Crab War Ships.

MESSRS. EDITORS:—Perfection is only to be found amongst the numerous specimens of the handiwork of the Great Creator, which he has placed so lavishly around us for our use and instruction, and we should make the proper application of the lessons which are continually placed before us. If we seek color, form, or perfect adaption to the use intended, we can find them all among the many models which nature has given us for guides. It was many years before the principle of the arch was discovered and applied, and yet every human being carried a perfect illustration of it in the arrangement of the bones of his body. And for lighthouses and towers, where can be found for stays or supports a better system than that shown in the roots of the sturdy oak. The design of the roof of the London Crystal Palace was taken from a leaf. A new and fashionable design for a calico pattern was found to have existed as a fossil many thousand years old. Palissey, the famous potter, discovered in a fossil shell a perfect system of defensive fortification. And now when the public mind and the minds of inventors are run wild over the changed system of warfare inaugurated with heavy guns and shot-proof vessels, let us see what nature will do for us. She furnishes a model of an engine of war, which, if made of suitable size, could destroy any vessel now afloat, in spite of iron plates, big guns, and almost anything else. I allude to the species of crab (L. *cyclops*) the king crab or horse hoof found on the coast of New Jersey. This creature is provided with almost everything requisite for a first-class ram ship, and to this I would invite the attention of scientific men and naval constructors. I will not enter into a scientific description of the animal in detail, but will simply state its most prominent features for the purpose specified.

In shape it is like a turtle, covered with a thick shell or armor, and armed with a sharp stylet or prow. The back of it is brought down wedge-shape, which will enable it to have considerable speed through the water. Its propelling power is placed underneath, so that its feet or paddles are hid and are not liable to be injured. It has apparatus to lower and raise itself in the water, around the bow, and it is armed with a row of smaller spikes, which would be sure to strike anything met in its path through the water. A vessel constructed to contain in itself the above-mentioned principles, with the addition of a telescopic smoke-stack and pilot-house, and perhaps a revolving prow, would be really formidable. Manned with a pilot, engineer and fireman, it could attack any vessel with impunity; being submerged when in action, and showing nothing but the smoke-stack, it could approach a vessel without being seen, and then, with its great speed and weight, it could strike a blow with the force of a dozen "Swamp Angels," thus utterly demolishing its opponent. If attacked and surrounded by boats, it could rise to the surface, spin around and scatter its assailants like chips. In fact, under almost any circumstances, I can see in a monster king crab admirable means for protection and defense.

C. D. K.

Frankford, Pa.

An Effectual Corset Wanted.

MESSRS. EDITORS:—The air we ladies have to breathe up here in Vermont circulates all round the world and is breathed by all the filthy creatures on the face of the earth, by rhinoceroses, cows, elephants, tigers, woodchucks, hens, skunks, minks, grasshoppers, mice, racoons, and all kinds of bugs, spiders, fleas and lice, lions, tobacco-smokers, catamounts, eagles, crows, rum-drinkers, turkey buzzards, tobacco-chewers, hogs, snakes, toads, lizzards, Irish, negroes, and millions of other nasty animals, birds, insects and serpents; besides it is filled with evaporations from dead decaying bodies, both animal and vegetable, and all sorts of filth, and we ladies are obliged to breathe it over after them, ough! bah!

Now we want, and must have, some contrivance that will effectually keep this foul, disgusting stuff out of our lungs. We have tried the three kinds of corsets which you noticed in your paper the last year; but when we do the best with them that we can, about a teacupfull of this nasty air will rush into our lungs in spite of these miserable contrivances, and when we blow it out again another teacupfull of the disgusting stuff will again rush in, and when we blow that out still another will rush in; and so we are obliged to keep doing from the time we wake up in the morning till we go to sleep at night, and I do not know but we do all night.

If these corsets are worth anything to keep this disgusting air out of a body, and we have not put them on right, please come immediately yourself or send the inventors to show us how. If they are a humbug I hope their inventors will be tarred and feathered and rode on a rail, and you, for noticing them in the SCIENTIFIC AMERICAN, be obliged to breathe about 60 pints of the nasty, foul, nauseous, filthy, disgusting, dirty, defiled, loathsome, hateful, detestable, odious, abominable, offensive, stinking air which surrounds this earth per minute for a hundred years.

SUSIE PINKINS.

[We can suggest but one kind of corset which would effectually meet our fair correspondent's wishes. Instead of the ordinary laced-up corset, take a piece of strong hempen cord and apply it closely about the neck, tie one end of it to a beam, and let the whole weight of the body suspend at the other end. We guarantee that if the cord is strong enough it will put an end to all future complaints on this subject.—EDS.

The French Railway System.

The reform of the French railroad system has lately been a subject of serious inquiry by the Government, and the report of a commission appointed two years ago, presided over by M. Michel Chevalier, has been published by order of the Minister of Public Works. It appears that the government directly controls the management of French railways, and there is not that freedom and individuality, and enterprise manifested in conducting them, as in America and Great Britain. The trains are slow but are generally very safe. The express trains in France carry the mails, hence they have frequent stoppages; and their total speed is below that of trains in the United States. The commission very warmly recommend a reduction in the fares of passengers—a recommendation which the companies are not inclined to follow, without special reasons. Passengers cannot be compared to merchandise: a company provides as many trucks as can be filled, but must always be prepared to carry a number of empty passenger-carriages at a loss. It would often be easy to reduce fares if every train could be filled. The goods traffic seems to suffer, while the passenger traffic gains, by the regulations imposed in return for monopoly. As French railways are not bound to dispatch any goods not delivered the day before the train starts, or to deliver them until the day after their arrival, it follows that, between several towns (Paris and Rheims, for instance), goods are a longer time on the way than by the old road waggons. The time of goods trains between Marseilles and Paris is nine days; the fast carriers on the road did it in ten days. The French companies defend their delay on the gronnd of the time required for weighing, classifying, marking, loading, and unloading; all which are well done, but too well done. It seems that there are constant disputes and law-suits in France between the owners of merchandise sent and delayed and the railway companies. Frenchmen are now crying out for greater speed, more branch lines, and easier terms for merchandise.

The Great West.

The four States of Indiana, Illinois, Iowa, and Wisconsin. have a computed area of 124,000,000 acres, or a surface of about one half greater than the whole British Isles. From 1850 to 1860 the area under cultivation rose from 11,956,269 acres to 25,949,886 acres—an increase of 142 per cent. At the same time the value of the farms advanced from $278,704,593, to $1,027,292,333; and the value of the farming implements rose from $15,924,442 to $39,645,875.

The population of these four states was 2,337,491 in 1850, and 4,513,208 in 1860.

The aggregate live stock of the four states was:—

	1850.	1860.
Cattle of all classes	1,946,756	3,724,726
Sheep	2,291,392	3,523,827
Swine	4,660,196	6,033,368
Horses and Mules	668,739	1,340,054

In other words swine increased in numbers 29 per cent., sheep 54, cattle 90, and horses 100 per cent.

The immense grain crops of these four states increased as follows:—

	Crop of 1849.	Crop of 1859.	Est. for 1862.
Wheat, bushels	21,445,745	63,624,450	83,812,946
Rye, do.	263,325	2.446,137	2,603,524
Barley, do.	391,063	2,605,133	2,971,680
Indian corn do.	119,257,125	233,620,654	290,639,035
Oats, do.	20,681,272	37,303,750	43,247,662

Such are the kind of products which constitute the foundation of our nation's material power.

AN English inventor, in the Eastern counties, has constructed a small paddle-wheel boat which is propelled by a pendulum. It is a jolly-boat, and the pendulum is worked by four men. He contends that it is operated with half the power of an oared boat. This principle is nothing new. It has been tried and found unsuccessful, for obvious reasons, well understood by scientific men. Many years ago, a Mr. Lenet, of Albany, tried the experiment on the Hudson, and found the direct application of power to the paddle-wheel was more effective than through the pendulum.

NEW RAT POISON.—The *Journal d'Agriculture Prctique*, recommends artificial carbonate of baryta to be mixed with various kinds of food for rats. This salt is almost tasteless, and it is said, does not become poisonous until after the action of the gastric juice renders the salts of baryta soluble.

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Heating Apparatus for Kerosene Lamps.

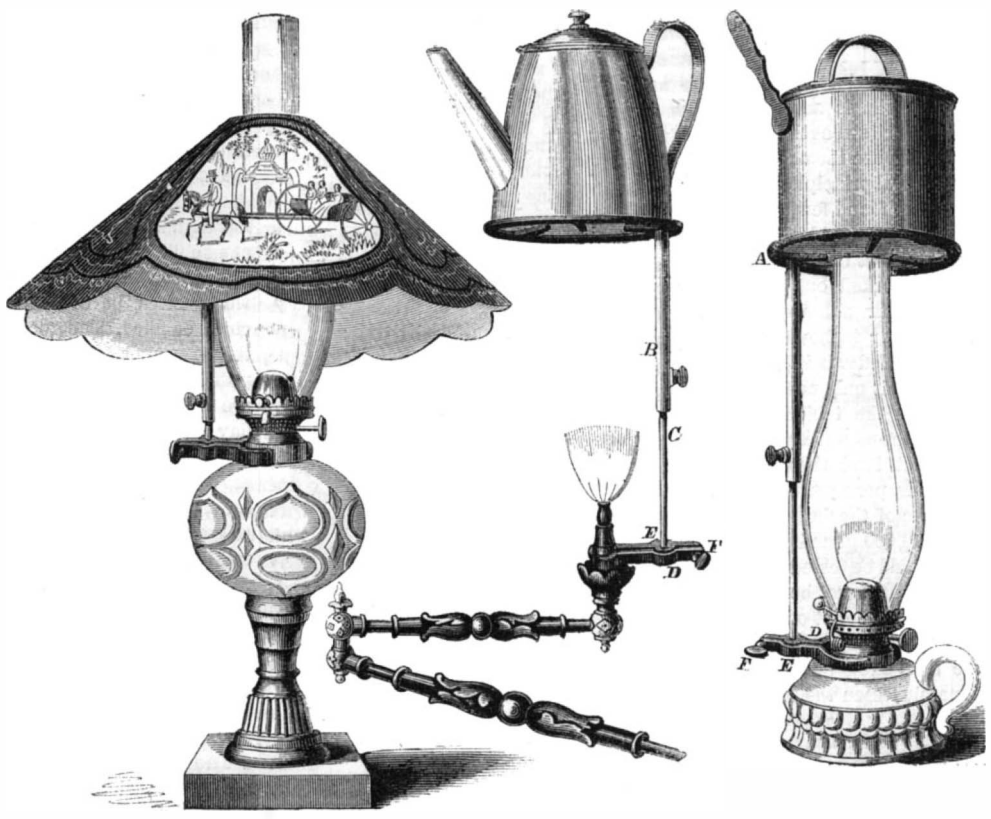
The discovery of petroleum and its adaptation to domestic uses is certainly one of the most wonderful things of the day. The rapidity with which it has come into general use, in many cases supplanting even gas as an illuminator, is also astonishing, and it is difficult to conceive what substitute could be found if the supply should ever give out.

Fish's patent kerosene lamp, which has obtained so wide a notoriety, and is acknowledged as a necessity in every well-regulated family, cooks the contents of the vessel attached to it by making the chimney constitute a flue, thus taking advantage of the large surface of the chimney as a radiator. The principle of this apparatus is different and is a modification of Mr. Fish's former invention, and can be used in connection with any gas or lamp burner. It consists of a light cast-iron stand, A, having a tube, B, securely fastened to its under side. This tube slides upon a rod, C, which is also fastened to a clamp, D. This clamp is of cast-iron, and is made in two parts, which are jointed together at F; one of the jaws which encircle the collar of the burner on the lamp is made longer than the other, and there are also three short raised edges inside the jaws, which bite into the collar and hold the stand firmly in place, when the thumb-screw, F, is set up tightly against the opposite jaw. The sliding tube is also fitted with a set-screw, so that the hight of the vessel to be heated can be regulated as desired. By the use of this apparatus a common glass chimney can be used, without endangering its safety or the contents of the vessel in process of heating. With fixtures that depend upon the chimney for support, it is evident that if, from any cause, the glass is broken, the vessel will be thrown down, scalding those in the vicinity. Such a casualty is impossible with this arrangement; for although the chimney is as liable to break as any other, its failure in no way endangers any one.

This apparatus also serves another purpose, as shown in the engraving. The screen or paper shade on the glass lamp is sustained by the cast-iron stand on which the pot or kettle ordinarily sets, thus furnishing a pleasant relief to the eye and holding the shade without burning it out in a short time, as is the case with all others now made. It can also be used over gas burners, as well as on kerosene lamps, and here it is even more efficient, as the absence of the chimney renders it possible to bring the vessel nearer the flame.

The plan on which this apparatus operates is clearly shown by the engravings: the clamp is merely slipped over the collar, the thumb-screw set up, and the task is done; the vessel above can be heated in from three to ten minutes, according to the condition and quantity of liquid in it. This apparatus is an exceedingly convenient one for invalids, nurses, sick, children, and for general use in the family; for making tea and coffee and cooking light food in summer, it is very useful, and as an efficient arrangement for economizing the heat of kerosene lamps it is unrivaled.

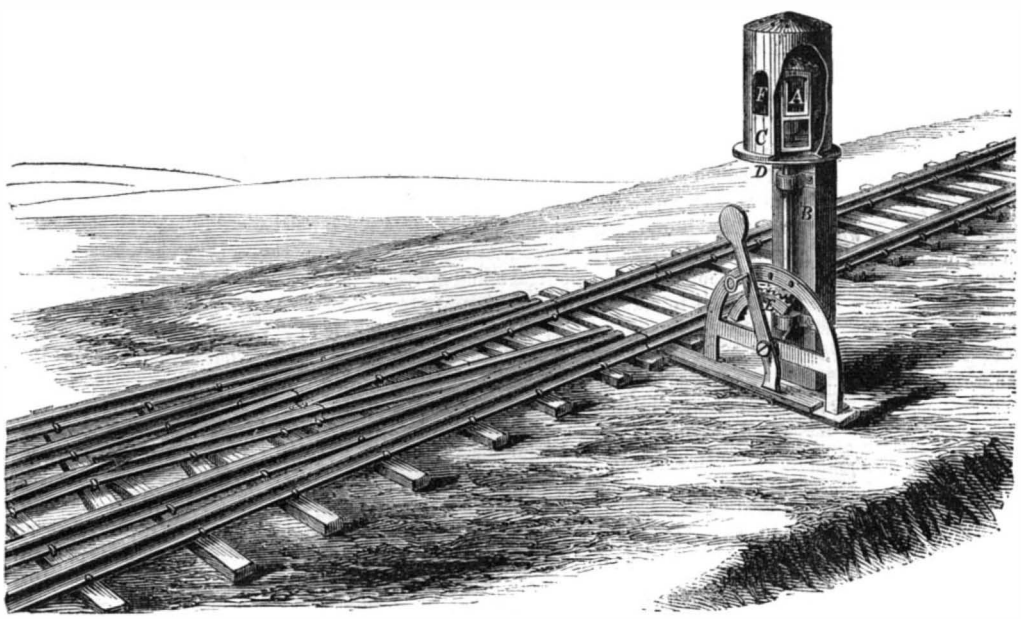
This attachment was patented November 17th, 1863, by Warren L. Fish, of Newark, N. J. For further information concerning this invention, address W. D. Russell, agent, No. 206 Pearl street, New York city.



FISH'S HEATING APPARATUS FOR KEROSENE LAMPS.

Improved Railroad Switch Signal.

So many accidents are continually occurring from misplaced railroad switches, defective signals, and the carelessness and inattention of those who have the safety of hundreds of lives in charge, that a self-regulating apparatus which places the possibility of accident from the causes above mentioned almost out of the question, has become an imperative necessity. Switchmen are generally the dumbest and most stupid creatures that are employed around a railway, and it is remarkable that such persons should be placed in such responsible positions. In the day-time an engineer can see for himself whether the switch is right or not, but in the night he must depend for safety altogether upon the fidelity of the switch-tender. The self-regulating signal illustrated herewith has this virtue—it cannot be misplaced, or set wrong, except through design, as the least attempt to change the switch turns the signal light, and any alteration from the correct point is shown by a glance.



BARNES'S RAILROAD SWITCH SIGNAL.

The mechanical arrangement is readily seen; the lantern, A, is set with glass of different colors, and is placed on a rod, B, and shielded by the case, C; this rod runs through the stands, D, and is revolved by the action of the rack and pinion, E. As the lever is thrown over it turns the pinion, which revolves the lantern, so that each color is in turn brought opposite to the opening, F, in the case.. As the engineer of a regular train knows, of course, what color or signal shows the way to be clear and the switch right, he has no hesitation, but proceeds when he sees the beacon: the lanterns screws down on a shoulder, so that it always sets in the same place, and the outside case may be locked, if necessary, to secure the lantern from being tampered with; no lock is necessary on the switch lever, as the lantern records every movement made by it; suitable vents or air holes are made in the lantern and case.

A patent on this invention was issued to H. H. Barnes, of Mexico, N. Y., Dec. 15, 1863, through the Scientific American Patent Agency. For further information address the inventor at that place, or through Messrs. Lord & Andrews, 41 and 43 Warren street, New York.

England Imitating our Ordnance.

We are going to pay the Americans the highest compliment which one nation can pay to another—imitate them. Our cousins having sent some agents to this country to find out what we are doing in the way of guns, we are doing likewise, and Captain Goodenough, R. N., has set off for America, to learn all that he can about the Dahlgrens, and Parrotts, and Brookes. It is time we did this, for every day shows us more and more completely that we are nowhere in the matter of artillery, and that we have wasted three precious years in order that Sir Wm. Armstrong might enjoy supremacy in our arsenals. The latest report of the Elswick doings is that the 600-pounder at Shoeburyness is going. In spite of all the care that was taken to prevent the gun from heating, and which was the reason why it was fired only three times an hour, the piece has shown ominous indications of failure. But *n'importe*, Sir William Armstrong is building a one thousand-pounder, which will cost us only £10,000. *Liverpool Courier.*

[The very confident tone of the English journal indicates that there can be no possibility of our refusing to grant so "simple" an act of courtesy.—Eds.

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THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

VOL. X. NO. 5...[NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, JANUARY 30, 1864.

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DRYING FLOUR.

In the market columns of a Liverpool paper, American *sour* flour forms one of the items, and is always quoted at a low price compared with good flour. It consists of flour that has been damaged by exposure to water, or which has become heated by an excess of moisture contained in it. Such flour is used for making starch, also the sizing that is employed for dressing cotton warps. Much of this flour is damaged by water, when being carried on our lakes, canals, and rivers, and with more care this might be prevented. But the carrier is not to blame for the flour which becomes damaged by internal heating from containing too much moisture, when it is stowed in the hold of his vessel, as the same results will follow when it is kept in quantity in a store. But all this damage to flour may be prevented by drying it before packing in barrels, and the operation should not entail much extra expense when properly conducted. In France, where large quantities of flour are stored by wealthy bakers, much attention has been devoted to this subject, and drying machines are now employed for expelling the moisture from flour before it is stored up. The summer of 1860 was very damp in France, and much of the stored flour became heated, and was attacked with mildew. All the flour so affected lost much of its nutritive qualities, and yielded less bread according to the government standard. To obviate such a great evil, flour-drying machines have been introduced. The most successful resembles a long, vertical cylinder, in the interior of which is a spiral plate extending from top to bottom, revolving on a spindle. The plate is heated by steam pipes. The flour to be dried is received by a spout at the top, and is carried down on the warm spiral plate, when it is stirred by brushes to expose it uniformly to the heat. The moisture which escapes is carried off by a funnel, and the flour is discharged at the bottom, in a dry room, in the lower story of the mill, and is cooled before it is packed. It has been found that waterproof bags are the best article in which to pack it for long-continued storage. Of course, flour which is designed for use soon after it is made does not require to be thus treated, and as the climate in the interior of America is drier than that of France, our flour contains less moisture and is not so liable to heat. But allowing for this, it has too much moisture for lengthened preservation in store; and all that is designed for distant shipment, or for long storage, would be rendered more secure if submitted to such a drying process. It is well known that vegetables and most organic bodies will remain unchanged for a long time in a dry atmosphere, while they will decay rapidly when exposed to air and moisture. Kiln-dried meal and dessicated vegetables remain unchanged in places where they would, if moist, begin to deteriorate in a few days. These facts should not be overlooked in the preparation of flour for shipment, as vast quantities of it are injured annually for want of sufficient care being bestowed upon its preparation.

A CALAMITY AND ITS LESSON.

The shocking accident which recently occurred in Santiago, the capital of Chili, by which upward of 2,000 men, women and children were burned alive, is one of the most terrible incidents in modern history, and seems to have been the result of reckless and criminal mismanagement. The occurrence of a festival in the Romish church in that city, was made the occasion of a grand illumination, which was effected by the suspension of kerosene lamps in great numbers among fluttering streamers of muslin, garlands of flowers and articles of a similar light and flimsy nature. As was to be expected, the lights communicated to the inflammable materials, ran up to the frame roof of the church, and precipitated the blazing kerosene in showers of liquid fire upon the shrieking victims below; who, finding no escape from their doom, the one narrow entrance being choked by the tremendous pressure, perished miserably, within arms-length of their agonized friends without.

Passing from further discussion of this terrible theme, let us turn to our own land and see what insurance we have against a similar catastrophe. It is true that little danger is to be apprehended from illumination, but are the means of egress ample for any sudden emergency? Are not most of the principal theaters and churches restricted as to their outlets, and is there any positive assurance that in the public schools which are piled up, story on story, there will not some day, be another slaughter of the innocents, similar to that in ages past, differing only in the means or cause of death? Are not winding staircases with countless steps, so torturous that the brain whirls in ascending them, the rule, and straight exits, and broad, free outlets, the exception? Most certainly they are. And nearly every tenement house is at this moment another Chilian church. In the basements of these dwellings there are stores blazing away with kerosene lamps, above which precious human lives are hived like bees; a blow, a jar, is all that is necessary to spring a mine as destructive to life as the most infernal machine that could be devised by an engineer.

And who is to blame for this state of things? Simply the people themselves, that they do not compel their representatives to insist that immediate action be taken upon this subject by the authorities. Indignation is cheap, but grief is sacred; lives are as precious, and love as dear to the tatterdemalion as to the millionaire, and when a holocaust of human life is offered up as a burnt sacrifice to mammon, there are shudderings; "horrible," "horrible," passes from mouth to mouth, and soon the tragedy is forgotten. How long shall such things be tolerated?

STEEL BOILERS.

Some very practical, thorough and interesting experiments have been made in Prussia with steel steam boilers, an account of which has been published in *Dingler's Polytechnic Journal*. A steel boiler of the egg-end shape, 4 feet in diameter and 30 feet in length, without flues, was tried. It had a steam drum 2 feet in diameter and 2 feet in hight, and the plates were one-fourth of an inch in thickness. Beside it there was placed another boiler, similar in every respect, excepting that the plates were of iron 0·414 of an inch in thickness. The steel boiler was tested by hydraulic pressure up to 195 pounds on the inch, without showing leakage, and both the iron and steel boilers were worked under a pressure of 65 pounds on the inch for about one year and a half. During this period, the steel boiler generated 25 per cent more steam than the iron one, and when they were thoroughly examined after eighteen months practical working, there was less scale in the steel than in the iron boiler. The former evaporates 11·66 cubic feet of water per hour; the iron boiler 9·37 cubic feet. The quantity of coal consumed was on an average 2,706 pounds for the steel one in twelve hours, and 2,972 pounds for the iron boiler. The plates of the steel boiler over the fire were found to be uninjured, while those of the iron one were about worn out. In Prussia several worn-out plates of iron boilers have lately been replaced with steel, which, it is stated, lasts four times as long. As steel is twice as strong as iron, thinner plates of the former may be employed for boilers, and more perfect riveting can be secured. A greater quantity of steam can also be generated in the steel boiler on account of its thin plates, and thus much fuel may be economized. Such steam boilers should engage the attention of all who make and use steam boilers for engineering and manufacturing purposes.

REFORMATORY INSTITUTIONS.

Since the world became more civilized and enlightened it has taken a new view of criminal and pauper institutions, and these places, from being simply horrible dens of cruelty and torture, have risen through the efforts of noble men and women to be in some respects homes or asylums for the sinning or oppressed of all ranks in society. This is at least the view taken of the subject by the thinkers of the period, and the pens of the most profound logicians, of the most entertaining authors, have been well employed in directing attention to the abuses which have existed in conducting public asylums and jails for the unfortunate and depraved. Crime and misery in all its shapes will exist while human nature remains unchanged, and if we cannot trace any decided moral effect on society by reason of the different systems observed in penal establishments, there is at least a very marked popular prejudice in favor of reasonable kindness and leniency instead of brutality and harshness toward convicts and paupers, so as to give them every possible chance for reformation.

It is left for Boston. a city priding itself upon its refinement, philanthropy and cultivation of the social virtues, to outdo in respect of cruelty toward social outlaws the most abominable practices of the middle ages. For savage barbarity, indecency and utter disregard of the ordinary promptings of instinct, to say nothing of virtue, the superintendents of the Boston prisons have earned special infamy. It appears from investigations recently made that boys of tender age who play truant from school are sentenced for one and two years to the House of Correction, and when once committed to the mercies of the brutes who controlled it, were kept in special ignorance of everything except such wickedness as they inevitably acquired by contact with the more depraved inmates. Thus a frolicsome, sportive child, who may have erred in not going to school, is rapidly converted into a criminal of the first class by this enlightened mode of correction. The vagaries of "Squeers," immortalized by Dickens, are not equal to the development of such an ingenious mode of making convicts out of honest youths in the shortest space of time.

In addition to this, the Boston institution possesses peculiar facilities for blunting what little remains of virtue and modesty the unfortunate females who enter it may have retained; for a common custom was to compel members of both sexes to bathe *in puris naturabilis* in full view of each other. So also, with horse-whips and rattans, half an inch thick, these overseers enforced their authority, and not only with the scourge, but by the terrors of darkness, silence and restricted diet, did they endeavor to turn these unfortunate wretches, whom the chances of the law had delivered up to them, into maniacs. It is well for these outragers of public feeling that the war furnishes them a shield, so to speak, for by its more absorbing interest they are placed in the back-ground. The people of Boston are fully alive to the enormity of the offense, at last, but it is astonishing how such iniquity could have been carried on unchecked for any length of time.

The moral reform of delinquents is a subject for serious thought; how can it best be accomplished? Certainly, the lash and cruelty seem to have but little effect, while kind and humane treatment at least appeals to whatever spark of virtue may remain in the offender's breast, and in the long run is undoubtedly more effectual as a means of curing moral obliquity than severity. All experience both in the old world and the new, tends to show that criminals are converted into hopeless imbeciles by steadfast and unremitting punishment; while, on the other hand, a moderate degree of indulgence has been the means of restoring some hope of a better life in future to the breast of the repentant transgressor. Of the two systems there can be no doubt but that judicious leniency is better as a means of attaining the end desired—namely, to restore the wanderer to usefulness and a life, if not of honor, at least of quietness and peace.

THE New York *Herald* publishes a list of fires in the United States during 1862, involving a loss respectively of over $20,000. Of these there were 150, with an aggregate loss of $14,060,000.

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THE NEW REVENUE CUTTERS.

The new steam vessels about to be added to the revenue service of the country will certainly be the finest ships of their class the nation has ever possessed, if they are completed according to the designs of their builders. The officials charged with their construction have taken the right course to obtain the best models for the purpose. We are informed that the Revenue Department made known their wishes to prominent ship-builders of the country, stipulating only that the load carried and draft of water of the several vessels, six in all, should be the same. In all other respects the builders were left to carry out their own ideas in respect to model, &c., untrammeled; the result is a collection of beautiful ships. A marked difference is observable by the mechanical eye in the proportions of the several hulls, and it is confidently believed that each and all of the cutters will not only prove themselves worthy of the expectations they have excited, but they will inaugurate a new era in this class of our national steam marine. Most of the vessels heretofore commissioned for this duty were exceedingly unfit for it, the *Harriet Lane* (now in the hands of the rebels) alone excepted. They are nearly all old-fashioned models, and wallow about in the most approved style in a heavy sea. The new ships will be both fast and elegant in their proportions, and will constitute a fleet which the nation may well be proud of.

Mr. Thomas B. Stillman has been indefatigable in his efforts to secure the very best ships that could be made by our ship-builders. The particulars of the hulls as regards length, depth and breadth are as follows:—Total length between perpendiculars, 130 feet; extreme width, 27 feet; depth of hold, 11 feet; and draft of water at load line, 9 feet. The vessels are all alike in this respect, are strongly fastened and are built of the best material.

The engines of these vessels are entirely new as regards their adaptation to the service in this country. Oscillating engines have been used for years, but not arranged in this particular manner. The neatness of the design, compactness of the details, and mechanical arrangement, generally, strikes the professional observer favorably, and much credit for them is due to Mr. I. V. Holmes, the superintending draughtsman at the Novelty Works, where the engines are now building. Mr. Holmes is a skillful draughtsman as well as a courteous gentleman, and we are indebted to him for many favors of a professional nature. The cylinders of these engines are 30 inches in diameter by 30 inches stroke, and are inclined to the propeller shaft, so that they work on it at an angle of 45°.

The cylinders are below the crank shaft, and on each side of it; and both piston rods are connected to one crank pin by single-ended connections; the cylinders being set slightly past each other so as to admit of this arrangement. The valve gearing consists of a double-ported slide valve, worked by eccentrics through link motion, and having a range of cutting off from three-eighths to three-fourths of the stroke: the exhaust passages being made large and free, so that little or no trouble is to be apprehended from back pressure. The air pump is worked from the end of the main shaft and sets on a bed plate outside the main frame, but close to it, and is driven direct by a crank and connecting rod from the shaft, as before stated. The bilge and feed pumps are set on the other side (fore and aft) of the frame, and are well arranged for accessibility and freedom of inspection at all times. The condenser is of the old-fashioned jet variety, and is ingeniously combined with the framing and bed plate. The whole space embraced by the machinery may be estimated at about 10 square feet. With all this compactness in the arrangement of the engines there is no confusion or complexity; no flanges cut off for clearance, pumps shorn of their proportions, columns chipped, or bolt holes half cut away, to save a sixteenth of an inch; but each part has a fair degree of freedom allotted to it, so that the machinery is at all times readily overlooked. It is a good feature to have the pistons work upward instead of down, as it avoids the nuisance of leaking stuffing boxes, which drip continually when under way or standing with steam up. The engines are geared, so as to drive the screw shaft $2\frac{3}{4}$ revolutions for one that they make, and the gearing is simply a large wooden toothed spur wheel, gearing into an iron pinion. The screw itself has a diameter of 8 feet, and is three-bladed, with an expanding pitch of from 14 to 16 feet. There are also the usual instruments attached to the engine, handsomely fitted in a frame, so that their indications can be seen at a glance. There is but one boiler, which has horizontal tubes and four furnaces. These engines, besides being artistically designed and put together in a workmanlike manner, will drive the vessels to which they are fitted rapidly through the water. It is hardly too much to expect that at least 40 revolutions of the engine shaft will be obtained, which will give upward of 100 revolutions of the screw and a little over 12 knots of 6,080 feet, minus slip of screw for the speed of the ship. This is mere speculation on our part, however, and we hope that even higher rates will be obtained. It will be interesting to notice the best results obtained by different lines in hulls with engines of similar power.

NEW WORK OF ART.

Mr. C. Schussele of Philadelphia, Pa., an artist of some distinction, has lately completed a large and beautiful painting, entitled "Men of Progress." It represents a group of some of the most distinguished American inventors, with a fidelity of portraiture which is in some respects remarkable. In order to place the work within the means and possession of the public generally, it has been reproduced on steel plate, by the celebrated engraver, John Sartain, and we now have a proof sheet before us. It is a noble picture.

In the center, upon a table, is one of Morse's telegraph machines, and grouped around are the various personages whose deeds and discoveries have rendered them illustrious in the eyes of the world. There is Morse, the father of telegraphy, conversing with Hoe of lightning press celebrity. Goodyear of rubber fame, Dr. Nott the oldest inventor and man of science now living, Ericcson of iron-clad renown, Peter Cooper the benefactor, Professor Henry the scientific secretary of the Smithsonian Institute, Burden, inventor of horse-shoe machinery, Bigelow of carpet looms, Sickles of the steam cut-off, Jennings of friction matches, Blanchard of irregular lathes, Howe of sewing machines, Mott of works in iron, Baxter of mint and coast survey machinery, McCormick of reapers, Colt of revolvers, Bogardus of iron buildings, Dr. Morton of etherization—forming altogether a galaxy of representative men, whose citizenship is an honor to the republic.

It would be difficult to find a more interesting or more permanently valuable work than this splendid picture. We commend it especially to the attention of young mechanics and inventors. Nearly every one of these "Men of Progress," rose from obscure life and adverse surroundings. Their elevation was the result of their own honest study and unceasing perseverance—means which are within the reach of every one. We wish that the picture we have described could have a place in all the workshops of the land. It conveys to every beholder the most impressive lessons of hope and encouragement in all the worthy purposes of life. Mr. James M. Wattles is the agent for New York and Brooklyn.

NEW YORK WHARVES AND PIERS.

Mayor Gunther in his message, calls attention to the defective piers of the greatest shipping port on our continent. With the best water front of any city in the world, New York has perhaps the poorest accommodation for shipping. In his message, the Mayor says, respecting the wharves:—

"The condition and character of these structures are not in keeping, to say the least, with the commercial rank and destiny of the city. The present plan compels the continual outlay of large sums for dredging out the slips, that are rapidly filled by the material washed in from the streets and sewers, while the decaying nature of the timber frames causes a necessity for constant repairs. Most of the great commercial cities possess stone piers or extensive basins, constructed in the most solid manner that engineering skill can devise, while New York, second to none in importance; retains the old timber frames, filled in with rubbish and loose stones, a constant source of expense, deteriorating the harbor and affording lurking places for countless rats that infest the shipping and injure the cargoes. I would recommend the adoption of a policy gradually to replace the present by stone piers. Solid stone walls laid in hydraulic cement might be built encasing the timber frames, increasing somewhat the breadth of the piers, and allowing a platform to be built outside and above the level of the roadway for carts. Thus in the course of a few years a complete renovation might be effected, greatly to the advantage of the city in appearance, and in the more positive benefits of sanitary improvement, the accommodation of commerce, and the saving of repairs."

These are sensible remarks. We recommended the construction of stone piers in place of the miserable wooden ones now in use, more than twelve years ago. And in conjunction with these, we have also recommended the construction of iron sheds on the wharves, for the purpose of shipping freight. Millions of dollars worth of property is damaged every year by the rains to which goods are exposed, while lying on the wharves after being discharged or before being shipped. Sheds, such as those on the Liverpool docks, should be erected on the New York wharves.

TURPENTINE AND BENZINE.

Three years ago turpentine could be purchased at prices ranging from thirty to forty-five cents per gallon, according to quality, and it was then extensively employed for mixing with paint—as a drier—and in the manufacture of a burning fluid, composed of four parts alcohol to one of camphene—purified turpentine. At present the price of turpentine is three dollars per gallon, and it is but little used. Burning fluid, which was a very dangerous substance, has happily gone out of use, and benzine—the light eupion oil, derived from petroleum—has taken the place of turpentine as a paint mixer. It is stated that it is superior to turpentine for this purpose. As its price does not exceed that of turpentine at its lowest figure, it is a subject of congratulation that it forms such an excellent substitute for it. But besides the uses stated of turpentine, it was also very extensively employed as a solvent for resins and asphaltum, in the manufacture of varnishes. In this department of industry, its place has also been supplied by benzine, which, although not quite so good, answers very well for the purpose. The oil springs of Pennsylvania have, therefore, not only been of vast benefit and advantage in supplying the cheapest burning fluid ever brought into use, but also in providing painters and manufacturers of varnishes with a cheap substitute for turpentine.

AMERICAN RAILROADS.

The number of miles of railroad completed Jan. 1, 1864, in the twenty-four loyal states is 24,926, but the total number completed and in the course of construction is 34,807 miles. The cost of their construction and equipment is $1,025,115,742. So far as relates to the condition of the railroads in the rebel states we have but little information, yet it cannot be doubted that they are in a bad state, both as regards the permanent way and rolling stock. From apparently reliable accounts obtained from prisoners who had been conveyed over some of these lines, the tracks and engines seem to have become so depreciated, that trains cannot be run in safety at a speed over six or seven miles per hour. They will get worse before they get better while the war lasts.

Last year was the most prosperous on record for our Northern railroads. They were all taxed to their utmost capacity in carrying freight and passengers, and most of our city merchants believe that we have not a sufficient number of main lines for the business of the country.

Trow's Daily Calendar.

One of the most convenient as well as sightly calendars we have seen in a long time is issued by John F. Trow, 50 Greene street. It is decidedly novel in design, consisting of a number of slips of paper bound together, having the month, the day of the month and the week, in prominent figures and letters, also sunrise and sunset, high water, phases of the moon, time tables, &c.; these slips are torn off each morning, being arranged in regular order, so that the dates are correct. There are also historical facts under their respective dates, which are entertaining as well as instructive. In 1835, Jan. 1st, we are told that Charles Lamb died, which is all very proper indeed. In 1863, Jan. 2, Mason and Slidell were released from Fort Warren, which was decidedly improper; but on

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Jan. 3d an important event occurred—Marcus Julius Cicero was born; for business, and even so far as the entertainment of the general reader is involved, the advent of Marcus might have been supplanted by some event a little nearer the present day. The calendar is a very useful one and will doubtless be extremely popular.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week : the claims may be found in the official list:—

Saw-mill Carriage.—This invention relates, first, to the employment of a dog constructed in a novel way, and connected with a lever or handle in such a manner that by a very simple adjustment of said lever or handle the log may be set to the saw, and the log-supports also gigged back when necessary to receive a fresh log to be sawed. The invention relates, secondly, to a simple and novel means for adjusting the log, so that the same may be sawed in taper form when required, and also to an improved means for holding the racks of a sliding bar, to which the log-supports are attached, in proper position and in gear with the pinions which operate them. Dennis Lane, of Springfield, Vt., is the inventor of this improvement.

Improvement in Ordnance.—This invention relates to the manufacture of ordnance of a central core or barrel containing the bore and a system of bands, hoops or rings of wrought-iron, surrounding the said core from the breech to within any desirable distance of the muzzle ; and it consists in a certain novel construction of and mode of combining the several parts, whereby the fibrous character of the wrought-iron is preserved and the union of the several parts is rendered such that their proper relation will not be disturbed by the firing of the piece, or by the heating and cooling to which it is subject in use, and, in short, to so construct ordnance as to obtain the necessary strength with the least weight of metal. John Ericsson, of New York city, is the inventor of this improvement.

Ash-ejector for Steam Vessels.—The object of this invention is to obtain a simple and efficient means for discharging ashes and other refuse matter from steam vessels, whereby the labor of elevating and discharging the same overboard as now practiced, will be avoided. The invention consists in the employment of a receiver provided with a valve, so arranged as to admit of a communication being formed between the receiver and the water at the exterior of the vessel, and to admit of said communication being cut off when desired; a pump or steam pressure, one or both, being used in connection with the receiver, and all arranged in such a manner as to effect the desired end. Jefferson Brown, of No. 14 Elizabeth street, New York city, and S. R. Brooks, of St. Louis, Mo., are the inventors of this improvement.

Electro-magnetic Pendulum.—The principal object of this invention is to apply to the pendulum power obtained from an electro-magnet, to maintain and also, if desired, to initiate its motion without subjecting it to the direct attraction of the magnet, or in any way attaching to it an armature or fixed magnet, or any piece of metal subject to the attraction of a magnet. The invention consists chiefly in the employment of wedge-shaped pallets in combination with the armature of the electro-magnet, and with one or more impulse bars and springs, whereby the above result is obtained. It also consists in so applying the said pallets in the circuit in which the electro-magnet is placed, that the opening of the circuit to produce the necessary intermissions of the current takes place between the said pallets. James Hamblet, Jr., and B. F. Edmands, of Boston, Mass., are the inventors of this improvement.

Surfacing Fibrous Materials.—This invention relates to the applying of a glazing or size to fibrous substances, such as cotton wadding, &c., in such a manner that a quite thin sizing may be used and applied to the material to be sized, glazed or surfaced, as it is technically termed, and said material dried at the same operation. To this end the invention consists in the use of a smooth or polished metal cylinder, heated by steam or otherwise, over a portion of which the web to be surfaced passes and has a heated pressure roller bearing against it; the metal cylinder having the glazing or size distributed over its exterior by means of a revolving brush or its equivalent, and at a point sufficiently distant from that where the belt comes in contact with the cylinder, that the glazing may become partially dry before being brought in contact with and applied to the web. The above parts are used in connection with a roller for cleaning the cylinder. William Fuzzard, of Chelsea, Mass., is the inventor of this improvement.

Breech-loading Fire-arm.—This invention consists in a certain novel construction and mode of applying the movable breech-block and certain means of operating the same, whereby the construction of the arm is much simplified and the use of a large number of small pieces, such as screws and pins, which are liable to be lost, is avoided, and the gun is enabled to be taken apart enough to clean all the working parts without the removal of a single screw. It also consists in certain means whereby provision is made for loading at the muzzle, when the supply of ammunition suitable for loading at the breech has been exhausted. And it further consists in certain improved means of withdrawing the discharged metallic shells of the ammunition used for breech loading. W. K. Stevens, of Worcester, Mass., is the inventor of this improvement.

SPECIAL NOTICES.

Joseph P. Pirsson, of New York City, has petitioned for the extension of a patent granted to him April 2, 1850, for an improved surface condenser for steam engines.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, March 14, 1864.

Daniel Hicks, of Dimcansville, Pa., has petitioned for the extension of a patent granted to him on April 2, 1850, for an improved attachment of the forge hammer to its helve.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, March 14, 1864.

Charles Perley, of New York City, has petitioned for the extension of a patent granted to him April 2, 1850, for improvements in cat head and shank painter stoppers.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, March 14, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extensions are required to file their testimony in writing, at least twenty days before the final hearing.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shal be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row New York.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING JANUARY 12, 1863.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

41,185.—Treating Flax, &c., to produce Short Fiber for Spinning.—S. M. Allen., Woburn, Mass.:

I claim, first, The herein-described process of preparing vegetable long-stapled fiber to be reduced to suitable length for spinning and weaving on short-stapled machinery and for other purposes, by submitting the fiber to the different operations of fermentation, washing, pressing, beating, &c., before drying the same, substantially as herein more fully set forth.

Second, I claim the herein-described process of converting vegetable long-stapled fiber into fiber of suitable length for weaving and spinning on short-stapled machinery, by combining with fermentation, washing and other mechanical and chemical operations before drying, the stranding or reducing of the fiber mechanically after drying the same, substantially as herein set forth.

41,186.—Pump.—M. J. Althouse, Waupan, Wis.:

I claim the barrel, C, the screw bolt, G, and the pin, H, when constructed and applied to a pump stock, B, substantially as shown and described.

41,187.—Horse-rake.—D. W. Amos, Bedford, Pa.:

I claim the combination of the knee-lever or connecting-rod, K, and lifting lever, J, with wipers on one of the wheels, substantially as described, for the purpose of enabling the driver to elevate and hold up the rake teeth without using his hands, as set forth.

I also claim the combination of the rake teeth with the bracket, I, when combined, arranged and operating as set forth.

41,188.—Grain Separator—Myron J. Barcalo, Mount Morris, N. Y.:

I claim, first, The longitudinally and vertically-adjustable separator, C, constructed of wire gauze or partly of wire gauze and partly of a metallic plate, in combination with the sieve of a fanning mill, substantially as described.

Second, The separator, C, constructed with a flat or arched surface and having the edge, c', turned up as described, for the purpose of preventing the grain which is cast upon the separator from falling over that edge.

Third, The sieve, A, and the separator, C, in combination with an adjustable discharging screen, D, which is shorter than the gains in which it moves, or of the same length, constructed and operating in the manner and for the purpose described.

41,189.—Adjusting Logs in Saw Mills.—D. C. Banghman, Adams, Ohio :

I claim, first, The shaft, D, supported beneath the head and tail blocks, A A', upon levers, e e', and operating substantially as described.

Second, The combination of pinions, f f', shaft, D, spur wheels, c c', and shaft-supporting levers, e e', all operating substantially as described.

Third, The spur wheel, C, in combination with the shaft, D, and driving pinion, n, operating substantially as described.

Fourth, The combination of the two-pawl levers, g and d, applied and operating substantially as described, for adjusting both ends of the log at one end of the machine, obliquely to the plane of the saw.

Fifth, The vibrating, driving pinion shaft, h', and pinion, h, in combination with the lever, E, and spur wheel, C, for operating the traveling plates, B B', substantially as described.

Sixth, The pivoted arm, h2, in combination with the rods, j j, and levers, E H, substantially as and for the purposes described.

Seventh, The combination of the trip-staff, p, catch, s, levers, t, and v, operating substantially as and for the purposes described.

Eighth, Applying a gage wheel, J, or its equivalent to operate in conjunction with a shifting pinion, h, and such mechanism as will throw this wheel, J, out of action automatically, when the log has been moved up to the saw the required distance, substantially as described.

41,190.—Clothes-washing Machine.—W. H. Blood, San Francisco, Cal.:

I claim the stationary concave of rollers, C, placed within the ends, box A, in combination with the oscillating rubber, K, attached to elastic plates, h, and connected by pendant bars, J J, to a rock-shaft, F, the bearings of which rest on spiral springs, D, and the ends or journals of which are connected to a treadle, I, all arranged substantially as and for the purpose herein set forth.

[This invention consists in the employment of a stationary concave of rollers fitted within a proper suds-box and used in connection with an oscillating, yielding or elastic rubber, the same being attached to a rock-shaft, the bearings of which are fitted on springs and the rock-shaft with a treadle attachment, all so arranged as to enable clothes to be washed in an expeditious and perfect manner, and without injuring the same by excessive or undue friction.]

41,191.—Sleeve Button.—Seba Bogert, New York City :

I claim the sliding catch, C, guide, D, and spring, h, combined with each other and with the head, A, and the hook, a, and notch, c, on and in the tongue of the button, substantially as herein specified.

[This invention consists in a novel mode of applying a sliding catch, a guide and a spring, in combination with the tongue or shank which passes through the holes in the garment and with the head of the button, whereby the fastening is made very secure strong, and easy of operation.]

41,192.—Refuse Ejector for Steam Engines.—Jefferson Brown, New York City, and Samuel R. Brooks, St. Louis, Mo.:

We claim ejecting or discharging ashes and other refuse matter from steam vessels by means of a receiver provided with a valve, and so arranged as to be capable of being used in connection with pressure exerted by a p ump, steam or other suitable agency, as herein set forth.

41,193.—Churn.—Edgar Chipman, New York City :

I claim the agitators, D, one or more, constructed of chambers, f, attached to shafts, e, in combination with the oscillating or rocking cream box, A, substantially as herein specified.

[This invention consists in the employment of a rocking or oscillating cream box provided with weights or counterpoises, and also provided with rotating agitators having cells or chambers.]

41,194.—Washing Machine.—Edgar Chipman, New York City :

I claim the combination of the seat, C, with the rocking box, A, of a washing machine, arranged substantially as shown, to admit of the rocking or oscillating of the box by a slight exertion of the occupant of the seat, as set forth.

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I further claim the hanging of the pressure roller within curved or segment grooves or bearings, d, in the box, A, substantially as shown, to admit of the self-adjusting relieving movement of said roller, as herein set forth.

[This invention relates to certain improvements in that class of churns and washing machines which are arranged to work or oscillate back and forth, and which are provided with a rotary agitator or pressure.]

41,195.—Sugar Evaporator.—R. S.Cole, Mount Pleasant, Iowa :

I claim the combined arrangement of the fire-place, C, descending or diminishing flue, D, shoulders, a b c, depressions, d e f, and partitions, g h, all as herein shown and described and for the purpose explained.

[This invention consists in the arrangement of shoulders facing toward the fire at the bottom of the pan or pans, one at the end of each section, in combination with a descending flue, in such a manner that the fire strikes those parts of the bottom forming the shoulders with increased power and the juice contained in the wells formed by said shoulders in the interior of the pan is heated quicker than the juice in the other parts of the pan, and thereby the scum is thrown up and separated with great facility.]

41,196.—Cow Milker.—L. O. Colvin, Philadelphia, Pa.:

I claim, first, The elastic bottom, A,, applied to the box or suction chamber, A, in connection with the partition, e, in said box or chamber, the plate, E, and the teat tubes, B B B′ B′, all arranged to operate in the manner substantially as and for the purpose herein set forth.

Second, The chamber, C, provided with the elastic plunger or piston, D, arranged relatively with the tube, G, as shown, so as to perform the double function of a plunger and valve, substantially as set forth.

Third, The combination and arrangement of the box, A, chamber, C, and tube, G, with the valve, I, and teat-tube, B B B′ B′, to form a new and improved device for the purpose specified.

[This invention relates to certain improvements in a cow-milking device for which Letters Patent were granted to this inventor on May 22d and 29th, 1860, and Feb. 17th, 1863. The object of the present invention is to reduce the milking device to the simplest possible form, render it capable of being operated with greater facility than heretofore, and also capable of having, when necessary and desired, two of the teat tubes cut off from the suction chamber, so as to have only two of the teat tubes operative.]

41,197.—Packing for Journal Boxes.—Jonathan Conk, Red Bank, N. J.:

I claim a packing, for the purpose specified, composed of the lostera marina (grass wrack, sea-eel grass), or other sea grass, dried or cured, and saturated with any suitable lubricating substance.

[This invention is designed as a substitute for cotton waste and other similar fibrous materials which have hitherto been used as a packing for the journal boxes of railroad car axles, the shafting of machinery and for other purposes where packing is applied in machinery.]

41,198.—Stove.—Charles Crozart Converse, Dubuque, Iowa :

I claim the arrangement of the toothed grate, D, rod, E, and treadle, F, with the hinged grate, A, and stove bottom, B, in the manner and for the purpose herein shown and described.

[This invention consists in the employment of a swinging toothed grate placed underneath the grate proper of the stove or furnace and so arranged in relation therewith that the toothed grate, when not in use, may be sufficiently far below the grate proper as to allow a free passage of air to the fire, and also allow ashes and cinders to escape casually through said grate proper, the bottom grate at the same time being capable of being raised when necessary so as to rake the fire to admit of the escape of ashes therefrom, and also clean the grate proper of cinders or clinkers, which may be wedged or caught between its bars.]

41,199.—Grain Drill.—T. R. Cornick, Independence, Iowa :

I claim the arrangement of the suspended scattering board, S, with the seed box, E, beams, K, stocks, M, braces, h, and shovels, N, all as herein shown and described.

[This invention relates to an improvement in the means employed for distributing the seed, and also in a novel and improved arrangement of the seed-covering device, whereby it is believed that several advantages are obtained over the ordinary seeding machines in common use.]

41,200.—Stove for heating Soldering Irons—Isaac Cressman, Philadelphia, Pa.:

I claim, first, The construction and arrangement of a pot or furnace for heating soldering iron by means of lighting gas mixed with atmospheric air, substantially as herein shown and described.

Second, The combination with a pot or its equivalent, gas burner and air chamber under the arrangement described, of a wire-gauze covering and grate, the two having interposed pumice stone, as herein shown and described.

Third, Combining the pot and gas-heating contrivances, with a reverberatory shell to concentrate the heat upon the iron, substantially as herein shown and described.

41,201.—Hinge.—John J. Crooke, New York City :

I claim the hinge above described, constructed by driving in a portion of the ends of the parts, B B, around the axis, and riveting or heading the ends of the axis, C, within the outer ends of the parts, B B, of the joint, as hereinbefore set forth.

41,202.—Closing Fruit Jars, &c.—R. M. Dolbey, Springfield, Ohio :

I claim the combination of clamp, C, slide, h, or its equivalent, and eccentric, k, when arranged to act on cover, B, or its equivalent, substantially as and for the purpose set forth.

41,203.—Molds for Casting Steel.—John Deere, Moline, Ill. :

I claim, for casting plow plates or other articles of steel, the use of molds prepared as herein set forth, that is to say, the body of the mold formed of dry sand or loam, and its internal surface coated with plumbago, both of which substances, previous to being used, to be moistened with an aqueous solution of fire clay, and the mold when so made to be thoroughly baked and dried in an oven or furnace, all substantially as and for the purpose herein described.

[The claim expresses fully the character of this invention which, it is believed, is a valuable one.]

41,204.—Skate Fastening.—John Doyle, of Hoboken, N. J. :

I claim the heel plate, B, attached to or cast with the block, C, which is secured to the runner, A, in combination with the slotted plate, H, secured to the sole, d, of the boot or shoe, and the adjustable bar, D, provided with the screw, G′, or its equivalent, and operated by the cam, E, all arranged substantially as and for the purpose set forth.

[This invention relates to a new and improved heel-fastening for skates, and it consists in the employment of a heel plate and an adjustable bar, the latter being operated by a cam and the former secured to the runner of the skate in connection with a hook or screw attached to the adjustable bar, and a slotted plate attached to the sole of the boot or shoe.]

41,205.—Piston for Steam Engines.—Henry D. Dunbar, Hartland 4-corners, Vt.:

I claim, first, a combined cut and uncut packing ring or rings with the outside or wearing surface broader than the inside or steam surface, which the steam, gas, air or water acts upon to expand, substantially as and for the purpose described.

I also claim the combination of the projecting and cut-away portions of the rings, a c, for the purpose of breaking the joint in the expanding ring, the two rings being united and operating together, substantially as herein described and represented.

41,206.—Operating Heavy Ordnance.—James B. Eads, St. Louis, Mo.:

I claim, first, the use of a lever, E, secured to the gun and held by a slide or other device at one end, in such a manner as to direct the muzzle of the gun to the port-hole, while the breech of the gun is raised or lowered.

Second, The mechanical devices substantially as described, for the purposes before mentioned.

41,207.—Turret and Pilot House for Ships-of-war or other Structures.—James B. Eads, St. Louis, Mo.:

I claim placing a pilot-house or "look-out" on a turret or other revolving iron-clad or shielded protector, in such manner that the turret may revolve freely, whilst the pilot-house remains stationary, and without using a central column or support to hold the latter from turning, substantially as and for the purpose described.

I also claim the mechanism connecting the pilot-house or look-out with the turret or gun protector, so that the occupant of the house or "look-out" may transmit his power to the tiller ropes, or to the bell or bells for signaling to the engineer or other officer in charge, substantially as herein describ d.

41,208.—Construction of Ordnance.—John Ericsson, New York City :

I claim, first, In a piece of ordnance composed of a central core or barrel and a series of surrounding hoops or bands, fitting the trunnion band upon the exteriors of hoops, j′ j′, and between the faces of other hoops, j j, of larger external diameter, when the said hoops all constitute one longitudinal series, and the interior diameter of those j j, are like those of j′ j′, smaller than the interior diameter of the trunnion band, substantially as herein described.

Second, The construction of a piece of ordnance of a central core or barrel, A, provided with a solid flange, a, around its rear end and fitted with a series of plate iron hoops or rings, j j′, two forged bands, k l, and a trunnion ring, n, the whole combined and secured by a nut, m, or its equivalent, substantially as herein specified.

41,209.—Eye Protector.—Dennis Everett, Attleborough, Mass.:

I claim, first, Forming the setting for the glass of an eye protector out of the same wire gauze of which the body is composed, substantially as described.

Second, Finishing the rim or setting for the glass of an eye protector with fusible metal, applied in the manner substantially as described.

41,210.—Sawing Machine.—R. Fanning, Clarksfield, Ohio :

I claim the self-adjusting frame, A B B′, beam, B″, and spike, F, in combination with the spring, N, and saw, K, the several parts being constructed, arranged and operated as and for the purpose set forth.

41,211.—Lock.—Philo S. Felter, Cincinnatus, N. Y.:

I claim the use of a vibrating bar, G, in combination with the bar, H, the notched disks, C, and the spindle, I; all arranged and applied to the lock to operate in the manner and for the purpose herein set forth.

[This invention relates to a new and improved guard attachment for locks, whereby the key-hole of a lock may be obstructed by a plate arranged in such a manner as to effectually prevent the insertion of a key for the purpose of opening the lock, and also prevent impressions being taken to form a key for the purpose. The plate being also arranged in such a manner that it may be adjusted or moved free from the key-hole by a proper or authorized person.]

41,212.—Freight Car.—Charles R. Foote & James Orton, Williamstown, Mass.:

I claim, first, A car body of cylindrical or an approximate form, with wheels fitted on its periphery and arranged to rotate with its contents or load on the rails, substantially as herein set forth.

Second, The frame, D, in combination with the car body, A, the journals of the latter being fitted in bearings in the former, substantially as described.

Third, The oblong bearings, c c, in the frame, D, in combination with the shoes, E, placed on said frame and all arranged to operate as and for the purpose set forth.

[This invention relates to a new and improved freight car designed more especially for transporting or carrying coal-oil and other liquids, grain in bulk, &c. The invention consists in constructing the body of the car of cylindrical or an approximate form and encompassing the same with bands provided with flanges to serve as wheels. The body of the car is provided with an axle the journals of which are fitted in oblong bearings in a frame and arranged in connection with self-acting brakes, all being combined in such a manner that the body of the car will rotate as it is drawn along, and it is believed several advantages are obtained over the ordinary freight cars in use.]

41,213.—Hooks for Garments.—Maltby Fowler, North Branford, Conn.:

I claim a hook having the two portions, a a, of the wire which form its back united by the whitening metal or alloy, substantially as and for the purpose herein specified.

[This invention consists in uniting the two portions of the wire of which the back of the hook is formed, by means of the coating of tin or other metal or alloy which is used for what is called the whitening of the hook, whereby the back is materially strengthened.]

41,214.—Machine for Surface-sizing Fibrous Materials.—Wm. Fuzzard, Chelsea, Mass.:

I claim the employment or use of a heated metallic cylinder, B, or one having a metallic exterior or periphery, in connection with a heated pressure cylinder, C, one or more, and a polishing roller, G, or its equivalent arranged as shown for the purpose of surfacing and drying simultaneously or at one operation fibrous materials, as set forth.

I further claim the distributing or throwing of the glazing or sizing upon or against the cylinder, B, or the web, E, by means of a rapidly revolving brush roller, J, or its equivalent running in contact with a roller, I, partially submerged in the glazing, whereby the glazing or sizing is thrown against the cylinder or web in a fine mist, as set forth.

41,215.—Grain Cradle.—A. P. Grover, Eureka, Wis.:

I claim, first, A metallic cradle finger when made nearly tubular, the back of the finger being left open in the manner and for the purposes substantially as set forth.

Second, I also claim the arrangement and combination of yoke, E, with the fingers, stirrups and brace-rods, substantially in the manner and for the purposes specified.

41,216.—Sheep Rack.—Robert Hale, Fitchburg, Mass.:

I claim the employment or use in a sheep-rack of pivoted feeders, arranged in such a manner as to form a hopper when the rack is in use and admit of being adjusted so as to prevent the animals having access to the rack while the latter is being cleaned or while it is being supplied with feed, substantially as herein set forth.

[This invention relates to an improvement in a sheep rack for which Letters Patent were granted to James P. Eaton, bearing date March 17, 1863. The invention consists in a peculiar arrangement in what are termed the "feeders," whereby the same when adjusted to admit of the cribs or troughs being cleaned out or supplied with feed, will prevent the sheep having access to the cribs or troughs.]

41,217.—Electro-magnetic Pendulums.—James Hamblet, Jr., & B. F. Edmands, Boston, Mass.:

We claim, first, The employment of wedge-shaped pallets, e f, applied in combination with the armature of the electro-magnet and with one or more impulse bars and springs, to operate substantially as and for the purpose herein specified.

Second, So applying the said pallets in the circuit in which the electro-magnet is placed, that the breaking of the circuit to produce the necessary intermissions in the current takes place between the said pallets.

41,218.—Knitted Fabric.—George Shaw Harwood, Newton, Mass.:

I claim as a new article of manufacture the knit broadcloth, fulled and finished as herein described.

41,219.—Hooks for Cam-rods of Steam Engines.—B, A. Haycock, Richland, Iowa :

I claim the combination of the adjustable bar, B, and adjusting wedge, D, with the hook-bar, A, substantially as and for the purpose herein shown and described.

[This invention relates to novel and simple means to compensate for the wear of the hooks of cam-rods of steam engines and other machinery, such for instance as the hooks of pitman or connecting rods, shake rods, &c., where a rod is connected to a crank or lever.]

41,220.—Explosive Shells for Ordnance.—Henry Helm, Salina, Kansas :

I claim, first, The use in shells for ordnance of friction primers the head of which projects from the surface of the shell, so that on the impact of the shell the wire of the primer will be drawn sufficiently to explode it, substantially as described.

Second, Also in combination therewith the use of an adjustable time fuse, for regulating the interval between the impact and explosion, substantially as described.

41,221.—Journal Box.—G. G. Hunt, Bridgeport, Mass.:

I claim the employment of a box, A, having hollow sides and hollow bottom, in combination with the axle, C, and wick, G, all in the manner herein shown and described, for the purpose set forth.

[This invention consists in the employment or use of a journal-box with hollow sides and bottom whereby an oil fountain is produced, from where the oil is carried up to the axle by means of one or more wicks, said wick or wicks being acted upon by weights or springs in such a manner that they are always held in close contact with the axle, and that they carry up the requisite supply of oil without allowing any waste.]

41,222.—Windlass.—Peter H. Jackson, New York City :

I claim the combination of the chain wheels, g g, ratchet wheels, d d, pawl levers, f f, walking beam or break, k, and chain connection, m, forming a double or single purchase, as and for the purposes specified.

41,223.—Butter Worker.—Nelson Johnson, Guilford, N. Y.:

I claim the bi-conical fluted roller, c, placed within a traveling or sliding frame, B, attached to or connected with the tray, A, as shown, in combination with the concave bottom of the tray formed of two longitudinal inclined planes, a, parallel with the two conical surfaces of the roller, substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of an inclined tray provided with a concave bottom formed of two inclined planes; in connection with a tramper of bi-conical form, fluted longitudinally and fitted in a traveling or sliding frame, all being arranged in such a manner that the butter may be worked very expeditously and thoroughly.]

41,224.—Saw-Mill Carriage.—Dennis Lane, Plainfield, Vt.:

I claim the dog, J, fitted in the lever, L, and connected with the lever or handle, O, substantially as shown, so that by turning said handle or throwing the same upward one end of the dog may be disengaged from its ratchet and the opposite end engaged with it, for the purpose herein set forth.

I also claim adjusting the log so that the same may be sawed more or less taper by means of the upright plate or bar, T, racks, f, and segments, S S, arranged with the arm, U, pawl, V, and rack, W, substantially as described.

I further claim providing the bearings of the shaft, F, with lips, a, arranged so as to project over the racks, D D, substantially as and for the purpose specified.

41,225.—Grate.—D. Lister, Glasgow, Great Britain :

I claim the construction of a grate of a hopper shape with a closed bottom and with apertures in its standing sides, substantially as and for the purpose herein specified.

[This invention was illustrated in No. 3, of the present volume.]

41,226.—Adjustable Candlestick for Tents, Shops, &c.—Alfred E. Lyman, Williamsburgh, Mass.:

I claim the candlestick or holder as herein described, as a new article of manufacture, substantially as specified.

41,227.—Machine for raising a Nap on Cloth.—Edwin T. Marble, Worcester, Mass.:

I claim the combination and arrangement of the two main draft and delivery rollers, F G, the two cloth stretchers, H H, the tilting rack, D, and the napping drum, A, the whole being arranged to operate substantially as specified.

I also claim the combination of the two friction apparatuses and the two positive connection apparatuses hereinbefore described or their mechanical equivalents, with the driving gearing or mechanism of the main draft and delivery rollers, F G.

I also claim in combination with mechanism for driving the rollers, F G, a means or mechanism substantially as described (viz, the gear, l, or its equivalent), by which that one of the two which may be delivering the cloth or drawing it forward may be revolved sufficiently faster than its mate to prevent the cloth from becoming slack.

I also claim the improved tilting rack constructed of the main and supplementary rack, to operate substantially as described.

I also claim the combination of the tilting rack, D, with the hand lever, E, by mechanism or means where by driving a movement of the said lever the rack may be tilted in manner as described.

I also claim the combination of the reversing mechanism of the stretching rollers, H H, with the said rollers, the rollers, F G, the drum, A, and the tilting rack.

I also claim the application of the roller carriages, d′ d′, to their respective rack rails, e′ e′, so as to project or lap underneath such rails, and the same operating to keep each of the carriages in connection with its rail.

41,228.—Refrigerating Dish Cover.—Obadiah Marland, Boston, Mass.:

I claim the within-described refrigerating dish cover with its reservoir or receptacle, B, for containing ice, arranged and operating substantially as described for the purpose set forth.

41,229.—Steam Engine.—George T. May, Tompkinsville, N. Y. Ante-dated Dec. 30, 1863 :

I claim, first, The reservoir, G, in connection with a modulator cylinder, F, substantially as specified.

Second, The combination of a modulator cylinder, F, reservoir, G, piston-rod, H, piston, I, steamports, 1 2 and 2′, 3 and 4, steam-chest, B, and valve boxes, C and D, substantially as and for the purpose set forth.

Third, The same in combination with a crank, K, shaft, J, and gearing, O, or equivalent connection with the main shaft of the engine, substantially as and for the purpose set forth.

Fourth, The art or method of modulating the mechanical effect throughout the revolution of an engine, by means of the reaction obtained from a volume of steam or other elastic fluid, cut off at the appropriate moments of time from the boiler pressure (if steam, or equivalent, if other fluid), and submitted to the process of alternate compression and attenuation under a piston operated from the engine; said process of compression and attenuation being effected within a combined modulator-cylinder and reservoir, substantially as described.

41,230.—Rim for Tables.—Elisha Mets, Rochester, N. Y.:

I claim as a new article of manufacture the bent rim, A, adapted especially to tables, constructed and arranged substantially as herein set forth.

41,231.—Cord-Tightener for Curtains.—John O. Montignani, Albany, N. Y.:

I claim the india-rubber spring band, d, extending from the fixed stud, e, to the strap or shell carrying the cord pulley or eye, for the purposes and as specified.

41,232.—Grain Separator.—Harrison Ogborn & John W Free, Greens Fork, Ind.:

We claim, first, The adjustable guide ribs, G, constructed and operated substantially as and for the purpose herein set forth.

Second, The suspending straps, I, attached to the under side of the front end of the shoe, c, substantially as described.

Third, The combination of straps, I, shoe, C, and guide ribs, G, as and for the purpose set forth.

Fourth, We claim the rocking lever, E, constructed as described in combination with the straps, I, and shoe, C.

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41,233.—Saddle Bag and Medicine Case.—Hyla H. Peacock, Philadelphia, Pa. Ante-dated Dec. 20, 1863:

I claim, first, The combination of the within-described cases with the strap, A, each case being composed of the two portions, B and B, hinged together and arranged to open, substantially as set forth for the purpose specified.

Second, The metal clasps, a a, arranged within a case for the reception and retention of bottles, substantially as and for the purpose described.

41,234.—Machine to Print Addresses on Newspapers.—Milo Peck and Charles Peck, New Haven, and Robert W. Wright, Orange, Conn.:

First, We claim the type or address blocks with beveled edges or the equivalent therefor, so arranged that when set up in a galley the blocks themselves constitute a ratchet by which the galley may be fed forward at regular intervals.

Second, We also claim the arrangement of wooden type or address blocks in columns or galleys, in such manner that while one side of the column forms a continuous ratchet of which each block is a tooth, as described, the other side or end of the blocks may form an irregular ratchet, operating only when a block containing a particular name or address is reached at any interval, substantially as described.

Third, We claim the binder, Fig. 6, in combination with the address blocks and galley, when used in the manner and for the purpose set forth.

Fourth, We claim the movable shield, p, in combination with the dog, k, the type or name blocks and the galley or their equivalents, as herein set forth.

Fifth, We also claim the feed lever, a a′, with the platen arm, d, the feed slide, h, and the dog, k, in combination with the wooden type blocks, when the blocks are so arranged in galleys as to form a ratchet moving at regulated intervals, substantially as described.

41,235.—Cable Stopper.—G. S. Perkins, Essex, Mass.:

I claim the cable stopper composed of a lever, A, furnished with a pair of claws, b b, as described, and to be applied in connection with the cable and with a shackle or its equivalent, substantially as herein specified.

Second, The prongs, c c, and pin, d, in combination with the prongs, b b, of the lever, A, substantially as and for the purpose herein set forth.

[This invention consists in a cable stopper of improved construction, whereby greater facility is afforded for slipping the cable and a vessel is enabled to get under way more expeditiously.]

41,236.—Sash-supporter and Lock.—Washburn Race, Lockport, N. Y.:

I claim as a new article of manufacture the combined sash-supporter and lock, C, consisting of the enlarged eccentric or stop, c, and the arms, d d′, the same being situated at the top of the lower sash, B, and arranged relatively with it, as herein set forth.

41,237.—Artificial Leg.—John Reichenbach, Pittsburgh, Pa.:

I claim, first, Forming the ankle joint by means of a hook and eye, or ring, one attached to the foot, the other to the end of the leg, forming an universal joint, in combination with springs of india-rubber or other elastic material placed in the cavity of the foot for the purpose of allowing the requisite motion of the foot with sufficient elasticity of tread, substantially as described.

Second, The mode of regulating the length of the leg from the knee to the sole of the foot by means of the hook and eye bolts, c and k, furnished with screw nuts, n n′, in combination with the india-rubber springs, i i, substantially as described.

Third, So constructing the ankle joint, substantially as described, as that when the leg has been turned on its axis in the foot the foot shall be automatically restored to its normal position in relation to the leg, when raised from the ground, by means of the combination of the hook and eye joint and india-rubber springs.

41,238.—Artificial Leg.—John Reichenbach, Pittsburgh, Pa.:

I claim, first, Constructing the knee of two hemispherical pieces, one attached to the thigh piece and the other to the leg piece, each working in a socket in that portion of the leg to which it is not attached and connected together by a center or joint pin, substantially as described.

Second, The use of a grooved pulley or disk, turning on the center or joint pin of the knee, for guiding the extensor cord, in its passage over the cap of the knee, substantially as and for the purpose hereinbefore specified.

Third, The combination of the hemispherical joint pieces, g g′, one attached to the thigh and the other to the leg, each working in a cup-shaped socket in that portion of the leg to which it is not attached with the hinge pieces, d d′, and hinge pin, e, either with or without the disk or pulley for the extensor cord the whole being constructed and arranged substantially as hereinbefore described.

Fourth, Also the use of an extensor cord attached to the leg piece below the knee, and extending over the pulley, f, over the cap of the knee, and thence passing up through the thigh, and having its origin in or being attached to a strap passed around the waist of the wearer and otherwise firmly secured to his body, so that by flexing the stump of the thigh outward from the body the extensor cord is sufficiently loosened to allow of the flexures of the knee joint, and by straightening the stump of the thigh or bringing it into a line with the body the extensor cord may be drawn tight, thereby straightening out the leg at the knee joint, substantially as described.

41,239.—Machine for Cutting Tags on Shoe Laces.—F. J. Seymour, Wolcottville, Conn.:

I claim, first, The notched cutters, h and i, receiving the double-tagged braid on a diagonal position, and compressing and separating such double tags, substantially as specified.

Second, I claim the yielding comb, n, in combination with the cutters that separate the doubled-tagged braid, substantially as specified.

Third, I claim the guide hole, f, in combination with the presser or clamp, g, for the purpose and as specified.

41,240.—Blacksmith's Truyere.—William Sharp, Millport, N. Y.:

I claim the combination and arrangement of the partially-rotating disk, D, and stationary bed plate, C, provided with the unvarying opening, e, and variable openings, g f, or their equivalents, with the blast pipe, A, and blast chamber, B, substantially in the manner and for the purposes shown and described.

41,241.—Sizing and Water-proofing Paper, &c.—J. N. Sigel, Alexandria, Va.:

I claim the process above described for treating fibrous materials to render them water-proof and increase their strength and durability.

[This process consists in the application to paper or other fibrous material of a solution made from any suitable resinous gum which has previously been purified to remove its oily or viscid property.]

41,242.—Breech-loading Fire-arm.—W. X. Stevens, Worcester, Mass.:

I claim, first, Operating a breech block, C, working transversely to the bore of the piece by means of a sliding rod, I, or its equivalent working longitudinally within the breech frame and combined with the said block by means of a stud and inclined groove, or other devices having a similar wedge-like action, substantially as herein specified.

Second, So constructing such sliding rod, I, or equivalent, and applying it in combination with the breech block, C, as to enable it to enter a notch in the said block, and so serve the additional purpose of securing the said block in position for firing, substantially as herein described.

Third, The combination with each other and with the sliding rod, I, or its equivalent of the spring locking pin, h, and the elbow lever, J, substantially as and for the purpose herein described.

Fourth, So applying a movable stop pin, k, or its equivalent that it serves at the same time to stop the opening movement of the breech, and as the means of preventing the withdrawal of the said block from the frame, and by a suitable movement will permit such withdrawal, substantially as herein described.

Fifth, The loose nipple, N, having a movement endwise to enable it to be suitably operated by the hammer to produce the explosion of a fixed ammunition cartridge, and yet capable of conveying fire to a charge from an ordinary cap, substantially as herein described.

41,243.—Fastening for Surgical Instruments.—George Tieman, Brooklyn, N. Y.:

I claim the turning fastener or button, applied to surgical and other instruments to retain them in position when opened out of a handle, as and for the purposes specified.

41,244.—Coal Scuttle.—W. B. Treadwell, Albany, N. Y.:

I claim, first, A coal scuttle or bucket constructed with an oval instead of elliptical bottom plate, a, an extended and contracted channeled mouth, A, and a semicircular back, substantially as described.

Second, I claim in combination the oval flange base, C, oval bottom plate, a, and oval body, A a′ b, as presented in figures 1 and 2 for the purposes described.

Third, Inclining the oval bottom plate, a, backward from the base of the channel, b, in combination with a longitudinally-extended and laterally-contracted mouth, A, substantially as described.

Fourth, I claim the two side fenders, D D, so applied to the scuttle mouth as to admit of the use of a poker when necessary to prevent said mouth from choking up with coal in emptying the scuttle, substantially as described.

Fifth, A coal scuttle constructed in all particulars substantially as herein described.

41,245.—Directing Guns by Adjustable Ports.—Richard Trussel, Brooklyn, N. Y.:

I claim, first, The combination of the port slide, B, applied outside of the embrasures and the self-closing port stopper opening outward by the running out of the gun, substantially as herein described.

Second, Elevating and depressing the gun by applying the necessary power to raise and lower the port slide by means of racks and pinions or their equivalents, substantially as herein specified.

41,246.—Leather and Rubber Soling.—G. F. Udell and Henry Mayell, Albany, N. Y.:

We claim the combination of leather in sides or large sheets with india-rubber soling, as described in the above specification, being a new and useful article of manufacture.

41,247.—Lock.—Rodolphus L. Webb, West Meriden, Conn.:

I claim, first, A tumbler, d, fitted loosely between the latch plates in combination with a swivel spindle latch, g c, substantially as and for the purpose described.

Second, I claim the arrangement of the spindle, g, spring, h, studs, f, yoke, e, and tumbler, d, operating substantially as and for the purpose described.

41,248.—Machine for Dressing Barrel Heads.—Peter Welch, Oswego, N. Y.

I claim, first, The combination and arrangement in the manner described of the foot rod, O′, lever, I′, shaft, J′, and clamp, D′, for the purpose specified.

Second, The mode specified of throwing the feed into and out of gear by the combination of the clutch, I J, fork, P, rod, Q, and fork, R, constructed, operated and operating substantially in the manner described.

Third, The adjustable gages, C′ D′, attached in the manner set forth to the rod, O′, and arranged and operated substantially as specified.

41,249.—Machine for Chamfering and Crozing Barrels.—Peter Welch, Oswego, N. Y.:

I claim the new and improved mode of imparting the feed motion to the crozing and other tools, as hereinbefore set forth, the same consisting in the combination of the stationary bevel wheel, P, with the wheel, R, shaft, S, worm, T, feed wheel, U, pins, f g, and slides, V and W, constructed, arranged and operating substantially in the manner described.

41,250.—Burning, Roasting and Smelting Ores.—J. D. Whelpley, and J. J. Storer, Boston, Mass.:

We claim, first, The heating and immediate quenching in water of finely-pulverized ores, substantially as described.

Second, The perpendicular, expanding flues, C, substantially as and for the purposes described.

Third, The horizontal, or nearly horizontal, flue, D, in combination with the flue, C, substantially as and for the purpose set forth.

Fourth, The combination of two or more furnaces with a perpendicular, expanding flue, substantially as set forth and for the purpose described.

Fifth, The auxiliary chimneys, K K′, over the furnace fires, for the relief of the fires during the process of kindling and extinguishing, substantially as described.

Sixth, The side openings in the perpendicular flue, at graduated distances, with brick or iron removable stopper, substantially as set forth, for the purpose of inspection and the admission of atmospheric air.

Seventh, The pouring of the material to be burned or roasted into the side hopper or air feed hole of a fan blower for induction into the furnace, in combination with the second blower, substantially as and for the purpose described.

Eighth, The projection of a perpendicular blast from a fan blower down through the top of the furnace and perpendicular expanding flue, carrying the material to be burned or roasted, substantially as described.

Ninth, The combination of two blowers, one at the head or above, and the other below in the horizontal flue, to produce a balanced blast, substantially as described.

Tenth, The use of a water bath, or a wet hearth, commencing at the bottom of the perpendicular flue and extending along the horizontal flue, substantially as and for the purpose described.

Eleventh, The use of the spray chamber, G, and feeding the same with water by an induction pipe or sluice from the top or side, substantially as and for the purpose described.

Twelfth, Connecting the pool of water in the spray chamber, by a circuit or canal, with the water external to the furnace, for the purpose of making a continual circulation, substantially as described.

Thirteenth, Supporting the drop chimney, C, and horizontal flue, D, on piers and arches, in a tank or trough, so that the surface of the water therein may in effect form a bottom to said chimney and flue and allow the deposits to be raked out under said arches, without opening the furnace or affecting the draft, substantially as described.

41,251.—Machine for Making Horse-shoe Nails.—Amos Whittemore, Cambridgeport, Mass.:

I claim, first, A reciprocating furnace, in combination with nippers, operating substantially as and for the purpose described.

Second, Applying the thrusting nippers which hold the rod during its forward movement to a reciprocating furnace, in combination with nippers applied to the frame of the machine, substantially as and for the purposes described.

Third, A reciprocating nail rod heating furnace, substantially as described.

41,252.—Nut and Washer Machine.—J. T. Wood and E. C. Smith, Pittsburgh, Pa.:

We claim, first, Rolling and partially perforating the nut blanks on both faces, before the nuts are severed from the bar, and preventing the bar from spreading laterally during the perforation, by means of a pair of rollers, one having a projecting belt fitting into a groove in the other, and finished with short punches or bosses, substantially as described.

Second, Also the use, in combination with the rollers constructed as above described, of the round punch, i, and dies, h and k, and die block, c′, for the purpose of making finished nuts, substantially as hereinbefore described.

41,253.—Apparatus for Evaporating and Refining Sugar. J. E. Youngman, Rockford, Ill.:

First, I claim the furnaces, A, B, C and C′, arranged as and for the purpose set forth.

Second, I claim the arrangement of the dampers, a a′, and b b′, in combination with the furnaces, A, B, C and C′, for the purpose herein specified.

Third, I claim the dampers, c, d and e, in combination with the flues, E and F, when arranged and operating as described.

Fourth, I claim the perforated spouts, K and N, in connection with the spouts, K′ and N′, for the objects and purposes set forth.

Fifth, I claim the bordered heaters, Nos. 5 and 6, for the purpose described.

Sixth, I claim the reservoir, J, for receiving the fluid part of the scum, as specified.

41,254.—Loom.—Caspar Zwicki, Pittsburgh, Penn.:

I claim the arrangement of the cams, a b, on the shaft, B, and of the cams, J K, upon the shaft, G, said shaft, B, having two revolutions to one of the shaft, G, and the cams of both shafts acting upon the rocking shafts, g, h, to work alternately and move out of action alternately the picker staves, substantially as described.

41,255.—Collar for Lamp.—J. C. Beers (assignor to himself and P. C. Skidmore), of Brooklyn, N. Y.:

I claim the combination of the part, C, with the ferule, by direct attachment, which allows the lamp to be opened sufficiently to fill it, substantially as and for the purpose set forth.

41,256.—Heater.—Henry L. Budd (assignor to himself and George H. Thorp), of New York city:

I claim, first, The case, f, at the rear of the fire-pot, in combination with the dampers, g and h, and pipe, l, as and for the purpose specified.

Second, I claim the plate, p, across the opening, o, of the vessel, m, through which the air circulates, and is, by said plate, divided and caused to enter the room or pass away by the hot air flue, as specified.

Third, I claim the half covers, q and r, united together and acting as specified, in combination with the plate, p, to direct the heated air as set forth.

41,257.—Tire-Upsetting Machine.—L. A. Dole (assignor to himself and A. B. Silver), of Salem, Ohio:

I claim, first, Making the wrought-metal key retainers of the tire-upsetting machine, with a contracted slotted portion, a, terminating in an enlarged eye, b, for the purposes described.

Second, The use of transverse wedge keys with V edges, in combination with the wrought-metal loops, A, applied to the anvil, B, substantially as described.

41,258.—Plane for Jointing Table Leaves.—T. P. Granger (assignor to himself and Josiah Best), of Pecatonica, Illinois:

I claim the herein-described series of planes for setting table joints, the same being constructed and used in the manner and for the purpose herein set forth.

41,259.—Composition for Percussion Caps, &c.—Heinrich Hochstatter, of Lauzen, Hesse Darmstadt, assignor to William Lange and Ferdinand W. Sennwald, of St. Louis, Mo.:

I claim the application of chloride of lead, compounded as described herein, as an explosive mass for the ignition of gunpowder.

41,260.—Hat.—Frank Howard, of Boston, Mass., assignor to Vyse & Sons, of New York city:

I claim a hat brim prepared and constructed substantially as herein described.

41,261.—Hat.—Robert B. Hurd, of Paterson, N. J., and William Halladay of Brooklyn, N. Y., assignors to themselves and John S. Giles, of New York city:

We claim a hat composed of buckram, covered with plush felt, the whole combined and constructed substantially as herein described.

41,262.—Device for Shrinking Tires.—Joseph Olmstead (assignor to T. P. Dinsmore), of Chicago, Ill.:

I claim the arrangements of the brackets, e e′, projecting from the ends of the eccentric, D, in combination with the wrist pin, d, pitmans, E E′, and hand lever, F, constructed and operating as and for the purpose shown and described.

[This invention is intended as an improvment on that class of tire-shrinkers in which the bar of iron to be shrunk, after having been heated, is secured on two blocks, one stationary and the other movable, and by forcing the movable toward the stationary block, the operation of shrinking is effected.]

41,263.—Corn Planter.—William F. Osgood (assignor to Orin F. Osgood), of Lowell, Mass.:

I claim the arrangement of the spring bar, F, constructed as shown, with the wheel, c, rollers, i, and slides, E H, in the manner herein described.

[This invention relates to a new and improved seeding machine for planting seed in either hills or drills. The object of the invention is to obtain a simple machine for the purpose specified, which may, by a very simple adjustment be made to plant the seed in either hills or drills, and also be very readily adapted for planting different kinds of seed or seed of different sizes.]

41,264.—Washing Machine.—D'Arcy Porter (assignor to himself and J. H. Woodman), of Cleveland, Ohio:

I claim the flexible series of rubbers, X, when constructed and arranged as described, in combination with the springs, K, and fluted roller, C, the several parts operating substantially as and for the purpose herein set forth.

41,265.—Sugar Mill.—Luther E. Porter, of Lake Mills, Wis., assignor to E. W. Skinner, of Madison, Wis.:

First, I claim the combination and arrangement of the roller, A, the adjustable journal box, D, with a lever or combination of levers, operating substantially as and for the purposes herein specified and shown.

Second, I claim, in combination with said adjustable box and levers, the employment of the sliding fulcrum, G, arranged and operating as and for the purposes herein shown and described.

41,266.—Apple-Parer.—E. L. Pratt (assignor to George R. Carter) of Boston, Mass., and D. H. Goodell, of Antrim, N. H.:

I claim the manner of operating the fork and knife of the apple-paring machine, by applying them to radial arms, d h, made to revolve around and to operate in conjunction with a wheel or ring, a, substantially as and for the purpose set forth.

I also claim so applying the mechanism which operates the knife that while the apple is rotating on its fork, the progressive movement of the parer can be arrested in the manner specified.

41,267.—Buckle.—John Stevens (assignor to himself, Achille F. Migeon and Franklin Farrel), of New York city:

I claim first, The tongue, a, formed as a bent lever by locating the fulcrum, c, above the strap, so that the tongue, a, shall clamp the strap as specified.

Second, I claim forming the buckle tongue or frame of sheet metal, bent up and united by the fulcrum or cross pin, as specified.

REISSUES.

1,603.—Method of Fitting the Heaving Socket and Head of Windlass.—Charles Perley, of New York city. Patented Nov. 13, 1849, and extended:

I claim, first, A windlass head fitted at the inner end upon a polygonal boss that is attached to the shaft or spindle, whereby the head can be easily removed as set forth.

Second, I claim a hand spike heaver fitted to take the teeth at the inner or larger end of the windlass head, substantially as and for the purposes specified.

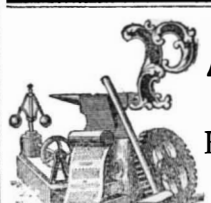
1,604.—Ship's Capstan and Windlass.—Joseph P. Manton, William H. Reynolds, Francis W. Reynolds, and William H. Taylor, of Providence, R. I., assignees by mesne assignments of James Emerson, of Worcester, Mass. Patented June 17, 1856:

We claim, first, The combination, substantially as described, of a friction brake with the independent chain wheel or "wild cat" of a ship's windlass or capstan, for the purpose of controlling the paying out of the cable of the vessel directly from the chain locker.

Second, The double or divided windlass or capstan, arranged for operation in the manner specified, and consisting of an upper hand operative portion of the body or capstan proper, G, and under loose portion of said body, H, the former being capable of working independently of the latter or in connection with it, at pleasure, substantially as herein described.

DESIGN.

1,883.—Design for a Bottle.—George Scott, of New York city.



PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during

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the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of ejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

Notes and Queries

J. G., of Md.—Your communication is of interest, but you have not stated where the furnace is located, nor where the ore is obtained, although we infer the steamboat you mention runs on Lake Superior. Be particular in describing the places in your next letter.

T. H., of Pa.—The south pole attracts the north pole of a magnet, and *vice versa*. When a small compass, therefore, is brought within the influence of a large and powerful one, the small magnet is rotated.

J. W., of Ohio.—You can obtain hydrometers for testing the strength of dye liquors in every city in the Union. They are sold by dealers in philosophical and chemical instruments. There is no book published, exclusively devoted to the treatment of water; but you can find all the information you want on the subject in any good elementary work on chemistry.

W. T. & Son, of Ohio.—The only water extractors that we have seen used for cloth in dyeworks are of the rotary character, with sides of wire gauze. None of the common cements will resist the action of acids, soaps and alkalies that are thrown upon the floor of a dyehouse. Such floors should always be laid close to the ground, in hydraulic cement.

H. & G., of Pa.—We must refer you to the patentees, Shaw & Linton, for information as to the details of their plan for burning petroleum as fuel in steam boilers; we know nothing about it.

J. D. W., of Ill.—Let the steam blow directly into the water of your bath; that is the quickest way to heat it. It is possible that your boiler is not large enough. A gallon of water converted into steam should raise five gallons of water (theoretically) to the boiling point.

N. N. D., of Mass.—Percussion pellets are composed of a mixture of the chlorate of potash, some sulphur and a little varnish or glue. They may also be made with the fulminate of mercury, some sulphur and a little varnish.

S. S., of Pa.—We do not think a patent has been allowed in this country for Aberdeen's method of uniting joints or seams. You could patent the device, providing you could prove priority of claim over the date of his foreign patent. Your subscription will expire July 1st.

W. C. F., of Ill.—We do not think such a statement as you make ever appeared in our paper. Two messages can be sent over a wire at the same time, when the intervals of one current are supplied by those containing the other messages.

J. W. S., of Ill.—You enquire what the Government is offering for a perpetual motion: We answer—nothing. We trust that the Government knows better than to expect ever to get anything of the sort.

D. K., of Ill.—Your letter relates to matter of personal interest to yourself, and not to our readers. If we should open our columns to all inventors, who might desire to publish descriptions of their inventions, our paper would not be large enough to contain them.

J. S. R., of Ohio.—We must refer you to the back volumes of our paper, for information how to put the finish on pistol barrels. It would consume a great deal of our time to look it up.

W. R. L., of Iowa.—We have considerable faith in the article you speak of. It is recommended on high authority as a preventative of incrustations from lime water, without injury to the boiler.

W. L. S., of Ohio.—The process of marbling the edges of books is by spreading the colors with a brush in a trough of water. the colors float in waves and specks, and the paper being applied to it, the color is absorbed in the form seen on the books. You should visit some book-binding establishment in order to get a correct idea of the operations.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Jan. 13, 1864, to Wednesday, Jan. 20, 1864:—

A. C., of N. Y., $28; G. W. W., of N. Y., $14; A. E. McG., of Minn.; $20; E. P., of Mass., $20; J. S. G., of Mich., $20; A. P. C., of N. Y., $20; T. J. K., of Ohio $20; P. & G. K., of Mass., $45; G. B. B., of Ind., $16; S. M., of N. Y., $41; J. R., of N. Y., $16; J. M. M., of N. Y., $10; T. & L., of N. J., $16; T. & T., of N. Y., $385; C. S. M., of N. S., $16; W. H., of Pa., $25; J. C. B., of Wis., $25; J. S. McC., of N. J., $16; M B. W., of Conn., $25; M. H. M., of Ohio, $25; A. A., of Cal., $30; C. R., of Ky., $16; M. S., of Mo., $16; S. D. E., of Penn., $16; C. B. H. of Mass., $33; J. P., of N. Y., $40; T. & R., of Ill., $20; J. S., of Ill., $25; G. F., of Conn., $16; A. P., of Chili, $25; A. P. S., of N. Y., $25; C. R. S., of N. H., $20; J. S., of N. Y., $20; A. C. C., of N. Y., $20; J. W., of Iowa $45; E. H., of N. Y., $60; J S. U., of N. Y., $26; J. D., of N. Y., $16; A. A. H., of N. Y., $41; J. C., of N. Y., $16; C. V. M., of N. J., $16; C. D., of N. Y., $16; J. L. H., of Mass., $25; C. M. W., of N. J., $16; W. H. W., of N. H., $16; H. S. S., of Mass., $25; M. L., of Penn., $28; R. W. P., of Mass., $16; C. F., of Ill., $53; G. H. S., of Conn., $25; R. S. H., of Iowa $20; W. & P., of N. Y., $41; P. C. C., of Cal., $30; C. T., of N. J., $25; S. D. T., of Mass., $25; J. T. of Ind., $25; G. M., of Conn., $25; S. & S., of Ill., $26; A. J. M., of N. Y., $50; R. W. P., of N. Y., $25; S. L. H., of N. Y., $28; L. E. P., of Mich., $20; R. E., of N. Y., $41; R. L. S., of Mich., $20; P. McG., of Iowa, $20; L. D. B., of Ind., $20; W. H. W., of Wis., $20; I. S., of N. Y., $16; G. H. H., of N. Y., $46; M. T., of Iowa, $32; J. R., of Ill., $22; C. T. B., of N. J., $16; N. H. R., of N. J., $25; R. T. S., of N. Y., $61; W. N. B., of Iowa, $40; W. C., of Mass., $25; G. S., of Maine, $25; D. & J. S., of Pa., $15; J. L. J., of Conn., $25; J. S. F., of N. T., $30; F. B., of Ill., $15; J. G., of Minn., $10; J. L., of Iowa, $130; J. C., of N. J., $16; Mrs. S. W. H., of Ind., $16; J. B., of Ohio, $15; T. S. M., of Ohio, $29; L. R., of N. Y., $1.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Jan. 13, 1864, to Wednesday Jan. 20, 1864:—

O. C., of N. Y.; A. P., of Chili; R. W. P., of N. Y.; J. H. of England; G. W. W., of N. Y.; S. M., of N. Y.; S. L. H., of N. Y.; A. P. S., of N. Y.; J. B. H., of R. I. (2 cases); A. A., of Cal.; N. H. R., of N. J.; C. T., of N. J.; I. L. H., of Mass.; A. J. A., of Ill.; G. S., of Me.; G. H. S., of Conn.; M. L., of Pa.; W. H., of Pa.; H. S. S., of Mass.; M. B. W., of Conn.; W. C., of Mass.; J. L. J., of Conn.; J. S. F., of Nevada Territory; C. B. H., of Mass.; S. D. T., of Mass.; J. T., of Ind.; E. A. C., of France; J. S., of Ill.; G. M., of Conn.; R. S. H., of Iowa; A. J. M., of N. Y. (2 cases); S. and S., of Ill.; T. S. M., of Ohio; J. R. P., of Conn.; R. E., of N. Y. J. S. U., of N. Y.

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A VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents :—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them——Importance of the Specification—Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees ; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No. 37 Park Row, New York.

PROPOSALS FOR BLANKETS.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, January 12, 1864.

SEALED PROPOSALS will be received at this office until 4 o'clock P.M., on the 30th January, 1864, for the delivery at the New York Agency, No. 45 Worth street, of the following Blankets, viz:

60,000 Regulation Cavalry Blankets, Prussian blue or Gentian dyed.
20,000 Regulation Artillery Blankets.

These Blankets must be of pure wool, close woven, of stout yarns.

FOR THE CAVALRY.

Blue, with an orange border three inches wide, and three inches from the edge, and the letters "U. S," six inches high, orange color, in the center of the blanket.

FOR THE ARTILLERY.

Red, with a black border three inches wide, and three inches from the edge, and the letters "U. S," six inches high, black color, in the center of the blanket.

All the Blankets are to be 75 inches long by 67 inches wide, and of the weight of 3,1875 lbs., or say 3 3-16 lbs., on which a variation of 0,1875, or 3-16ths of a lb. may be allowed. They must be single and not in pairs, and packed in cases of one hundred each. The value of the cases to be paid for at a price to be determined by the Inspector.

The Blankets are to be inspected at the factory where made, and none will be accepted or paid for but such as are approved on inspection.

Deliveries must be made as follows: One-tenth of the amount contracted for, per week, commencing within one month from the date of the contract.

Failure to deliver at a specified time will subject the contractor to a forfeiture of the quantity due at that time.

No bid will be considered which does not come from a manufacturer of blankets or regular dealer in such goods.

Bids will be considered for the delivery of the blankets at the factory, as well as at the agency above mentioned.

Each bid is to be accompanied by the names of the sureties of the proposal.

Each party obtaining a contract will be required to enter into bonds with approved sureties for the faithful execution of the same.

Upon the award being made, successful bidders will be notified and furnished with forms of contract and bond.

The Department reserves the right to reject any, or all the bids, if deemed unsatisfactory on any account.

Proposals will be addressed to "Brigadier-General George D. Ramsay, Chief of Ordnance, Washington City," and will be endorsed "Proposals for Blankets."

GEORGE D. RAMSAY,
5 2 Brig. Gen. and Chief of Ordnance.

TO HORSE SHOERS—HORSE OWNERS.

Warren's Patent Nail Nipping and Clenching Tool saves the unpleasant and often painful operation of hammering the hoof. With this Clincher the work of shoeing is quicker and better done than with the hammer. It has received the unqualified approbation of a large number of horse-shoers and dealers. Shop, Town, County, and State Rights for sale, cheap. Send for Circular to

E. WARREN, Patentee,
5 2 * Marshall, Mich.

THE HERALD OF LIFE AND OF THE COMING KINGDOM.—GEORGE STORRS, Editor and Publisher, is issued weekly from Room 22, No. 37 Park Row, New York, at $2 a year. It advocates a future life to those only who believe in Christ, who is soon to appear to reign on the earth in the kingdom of his father, David. Address, "GEO. STORRS, Box 4658, New York." 1g

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DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., Dec. 15, 1863.

To the Growers and Manufacturers of Flax and Hemp :

THE COMMISSIONERS APPOINTED BY THIS DE- partment, consisting of Hon. J. K. Morehead, of Pennsylvania, William M. Bailey, of Rhode Island, and John A Warder, of Ohio, to consider the following appropriation made by the last Congress, viz.:

"For investigations to test the practicability of cultivating and preparing flax and hemp as a substitute for cotton, twenty thousand dollars."

Having met, and after several days' investigation, believing that a further and fuller notice of their investigations might produce valuable results, adjourned to meet again on Wednesday the 24th day of February next, at 12 o'clock, M.

They request all interested in the distribution of this appropriation, or anxious to develop the subject for the public good, to send to this Department, on or before that day, samples of the hemp and flax in the different stages of preparation; of the fibers and fabrics prepared by them, accompanied by statements of the various processes used, and the cost of production in each case; also, descriptions of the kind and cost of machinery used, where made, &c., together with any and all information that may be useful to the Commission.

This information is necessary before an intelligent distribution of the appropriation can be made.
ISAAC NEWTON.
1 9 Commissioner.

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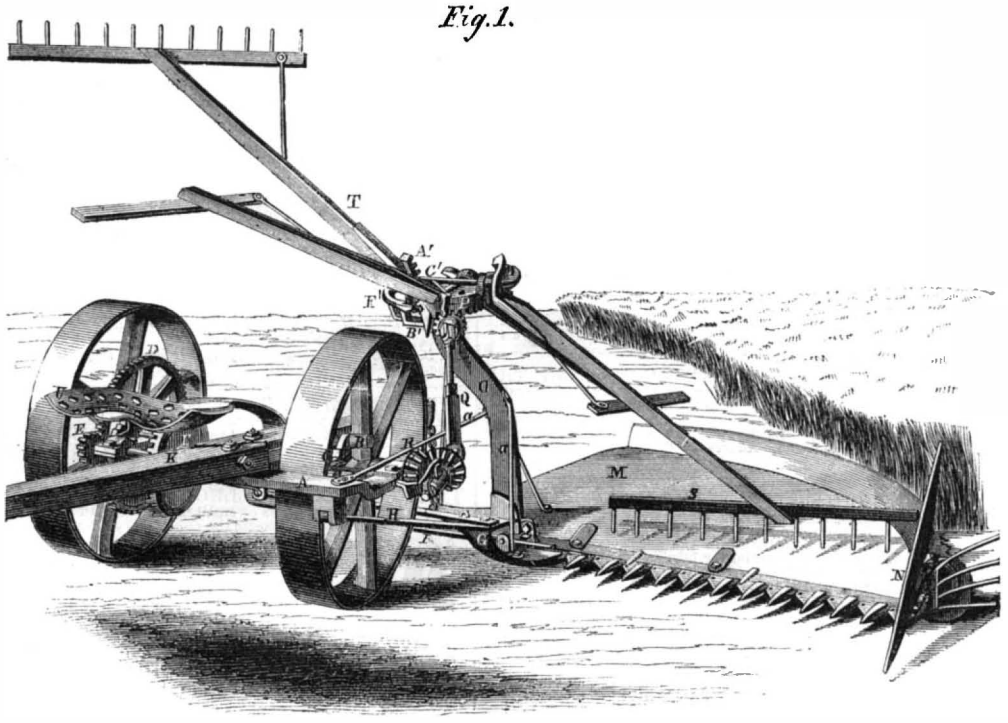
Fig. 1.

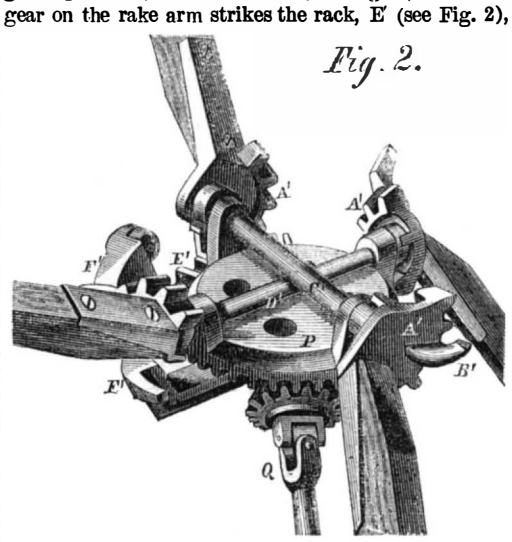


HOFFHEIN'S COMBINED HARVESTING AND RAKING APPARATUS.

The engraving published herewith represents the machine standing in the field. The principal part of the machinery is carried by a bed-plate, A, of peculiar construction. To this plate the axle and tongue are connected. The axle is not fastened to the bed-plate, but runs in boxes; neither are the wheels permanently fixed to the axle, but revolve easily upon it. They are fitted with a pawl, B, which takes into a ratchet wheel, C, on the shaft, so that when the machine is backed for any purpose the cutters do not operate; this pawl can be thrown out when required, so that in any case, going forward or backward, the driving machinery is stationary: the same spring that holds the pawl in the ratchet wheel also keeps it out of gear. The gearing that drives the finger bar is thus arranged:—The spur wheel, D, meshes into the pinion, E; the shaft of this pinion has a large bevel wheel, F, which gears with a bevel pinion, not shown in the engraving; on this latter pinion shaft (which runs down to the extreme back end of the machine) there is a face-plate with a wrist-pin in it, constituting a crank, and from this crank a rod runs directly to the cutter bar. This is the whole arrangement, and by means of gearing up from large to small wheels a high speed of the cutters is obtained. The finger bar has a shoe, G, at the end near the machine, by which it is carried, and this shoe has lugs on it which connect to the draw bars, H and I: through them the cutting apparatus is firmly braced to its work. The draft-pole, or tongue, K, of the machine is also made so that it can be shifted from its present position to a point outside of the wheels, either for cutting grain or grass. A track-clearer is shown at L, as also an adjustable castor roller, which carries the outer end of the cutting machinery. The grain platform, M, is secured to the finger beam by straps and bolts; the sheet iron grain fender, N, is also adjustable, and is fastened to its place by bolts.

A novel feature in this harvester is the arrangement of the raking apparatus, through which the grain is swept off the platform on one side in regular windrows. This mechanism is attached to the top of an upright timber, O, strongly secured to the grain platform; the timber is also rigidly braced to the main machine by the rods, *a*. On the top of the timber there is an inverted crown gear, P, which works on a center or journal; this gear is revolved by a small pinion, connected by a universal joint to a square bar, Q, said bar being connected by a second universal joint to a bevel pinion below. The whole of this mechanism, rakes and all, is driven by a bevel wheel, R, on the end of the main axle. The bar, Q′, is in two parts, one sliding within the other, so as to compensate for any unevenness of position, and the action of the machine is further aided by the universal joints between the upper and lower bevel gears. There is also an arrangement near the pinion, R, by which the rakes and their mechanism may be thrown out of gear. The ends of the rake arms are furnished with a section of a bevel gear, A′ (see Fig. 2), which has a short tongue, B′, projecting from one side; these rake arms are secured to two shafts, C′ and D′, running over the top of the inverted crown gear; at one side of the crown gear there is a toothed rack, E′, in which the gears on the rake arms work; as the crown wheel, P, is revolved by the advancement of the machine, the rake arms are swept over the surface of the grain platform, as shown at S, in Fig. 1; when the gear on the rake arm strikes the rack, E′ (see Fig. 2),

Fig. 2.



the rake is gradually elevated from the grain platform, and is carried round again (as at T, in Fig. 1) to the platform; the tongue, B′, on the lower end of the gear, A, slides upon the guard, F′, which sustains the rake while passing over the operator's head. The seat for the driver is shown at U.

This harvester has also an arrangement for raising and lowering the cutter bar and its atttachments, but it cannot be shown in the engraving, and the cutter bar also folds up at the side, so as to be compact and out of the way in proceeding to and from the scene of labor. All the machinery, whatsoever its functions, can be instantly thrown out of gear by raising the pawl of the ratchet wheel on the main axle, or the cutters may be thrown out and the raking apparatus kept at work; this is done by a small lever and coupling on the bevel gear shaft. At the lower side of the frame, on the back end, there is a flange cast, which runs under the crank plate and guards against accidental injury to the crank shaft; the attachment of the finger bar to an independent swivel joint, so as to turn slightly on its axis and facilitate folding of the bar against the side of the machine, when about to be transported, is also a good feature. The self-raking arrangement can be attached to any machine, either one or two wheels. It has been thoroughly tested and the inventor claims that it has no superior; unoccupied territory can be negotiated for by addressing the inventor.

This harvester was patented Nov. 3, 1863, through the Scientific American Patent Agency, by Reuben Hoffheins, of Dover, Penn. For further information address the inventor as above.

GAS IN NAPLES.—Gas pipes are being laid down in Naples. Hitherto, all the streets except three or four had been badly lighted with oil, but now gas will penetrate even into the most deserted quarters.

THE

Scientific American,

FOR 1864!

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